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THE TREATMENT OF TUBERCULOUS CERVICAL LYMPHADENITIS.*

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THE following remarks are based on a fairly comprehensive study of the literature of the last ten years and upon an analysis of the cases of tuberculous lymphadenitis admitted for operation to the service of Dr. C. H. Frazier in the University Hospital during the past twelve years (to January 1, 1913). They were operated upon mostly by Dr. Frazier and by those of us who have been associated with him during that time. Seventy of the cases were admitted during my own connection with the service.

Briefly, there were 103 cases studied; 50 in the male sex; fifty-three in the female. The cervical nodes were affected in 96, the inguinal in 3, the axillary in 3, and both the cervical and axillary in one. The ages ranged from 11 months to 40 years and may be subdivided as follows:

Cervical Cases (in infants under two years).—There were only two (2 per cent.) in this group; one, a boy of eleven months had developed a submaxillary mass five months before admission which had broken down and was discharging caseous

* From the Service of Dr. C. H. Frazier in the University Hospital, Philadelphia. Read before the Academy of Surgery of Philadelphia, April 7, 1913.

material through a sinus. There was no evidence of a portal of entry but an older brother had experienced the same affection. The mass was dissected out. The child recovered but returned to the hospital 17 months later with a tuberculous dactylitis which was curetted. In September, 1908, three years after the original operation, 19 months after the second, there was no evidence of either trouble. He has since been lost sight of. The other patient, a girl of sixteen months, developed acutely, seven months previously, a high anterior cervical swelling, which presented on admission a fluctuating mass. It was incised and partly dissected out. The tonsil seemed to be the portal of entry and one uncle had died of tuberculosis. Two years and nine months later the child was reported as being free from recurrence.

Approximately 3 per cent. of the 465 cases recently reported by Dowd were below the age of two years and he believes that this group shows less power of resisting tuberculosis than the other groups. One of his cases also developed a spina ventosa. Two of the fifteen died within six months of their operations but the ultimate results of the others were quite good. Some interesting facts are brought out by Harbitz (*Jour. Infect. Diseases,* 1905, vol. ii, p. 143) in regard to postnatal tuberculosis and he quotes cases where death has occurred as early as the eighth week. The source of infection in our cases could not be determined but must have been from milk or the dust of the floor. La Fetra (*Archives of Pediatrics,* 1907, xxiv, p. 418) has reported a case of tuberculous lymphadenitis in an infant of four months in which there was no evidence whatever pointing to the source of the tuberculous infection except the contraction of several colds and the fact that the father had a cold in the head at the time of the infant's birth. The child was fed on milk from a model farm and there was no sign of family tuberculosis. It was believed probable that the first cold was taken from the father or from the street dust and that later, perhaps through the inflamed tonsil or nasopharynx, the tubercle bacilli penetrated to the lymph streams leading to the deep cervical nodes.

FIG. 1.

Tuberculous cervical adenitis. Tonsils removed nine months previous, mass persisting. Location the usual one seen in children.

FIG. 2.

Ideal result fourteen months after operation. Scar scarcely visible. Transverse incision.

Cases in Children (two to seventeen years, inclusive).—In our series there were 49 cases in this group, 50 per cent. of the entire number. This corresponds to the figures of Fischer (46 per cent.) and is far below that of Dowd who observed that 80 per cent. of his cases were in this age group. All of the patients recovered from the operation and of 37 traced, the following was obtained: In 32 there was no recurrence; 2 had died; and 3 had suffered a recurrence.

One patient, a male, age three, was admitted August 19, 1901. The history is meagre, there was a tuberculous family history and several glands were removed from the neck, the wound being drained. A note on the history states that the child died in December, four months later, but I have not been able to verify it.

The second patient was a girl, seventeen years old, who for 18 months before admission had been developing a mass on the right side of the neck. When examined, April 7, 1904, she presented a mass extending from the mastoid to the clavicle. Many of the nodes were discrete and hard. The right lung was also involved. The neck was dissected out and on May 19, 1904, she returned and was operated on for a mass in the axilla. Death occurred November 28, 1904, from pulmonary tuberculosis.

Of the three recurrences, two were in young colored girls, six and eleven respectively, who had extensive bilateral masses in the neck. Both sides were dissected out but in both cases recurrence occurred and one of them is now in the Philadelphia Hospital with bone involvement; the other is living, six years after operation and with recurrence but I cannot ascertain the exact whereabouts. The third case was operated on in October, 1912, and has a slight recurrence. He has had careful X-ray treatment since operation by Dr. Pancoast.

NOTE.—Since this paper was read this boy was operated upon on April 28, 1913, by Dr. Frazier and a few nodes and some tuberculous granulation tissue were dissected out.

Thirty of the thirty-two cases free from recurrence have been heard from during a period of 1 to 11 years since operation, nineteen up to 5 years and eleven over five years; three cases operated on within a year are free from recurrence.

Cases in Adults (over 17 years of age).—There were forty-six in this group. These patients also recovered without exception from the operation and of 28 traced, 18 were free from recurrence, 4 had died, and 6 suffered from a recurrence.

The cases free from recurrence, with two recent exceptions, were heard from at periods varying from 1 to 12 years since operation. In seven cases over 5 years have elapsed.

Of the deaths, one, a man of thirty-three, was operated on in October, 1903, four years from the beginning of the affection during which time he had 3 operations elsewhere. There was spinal caries in addition; he died eighteen months after our operation. The second, a woman of twenty-six, was operated on in April, 1903. She had extensive involvement of both sides and they were dissected out in two sittings. She died two years later from pulmonary tuberculosis. The third death occurred in a man of twenty who was admitted during February, 1910, with a mass reaching from the ear to the clavicle. He died of pulmonary tuberculosis in March, 1912, but there was no recurrence in the neck and the letter states that the scar was scarcely visible. The fourth death, a man of twenty-six, was admitted in March, 1911, with a mass extending from the ear to the clavicle, and a mass in the groin and a pulmonary lesion. The cervical mass was of three years duration. He died six months after operation.

As to the five recurrences, Case I, male, age twenty-four, has a note on his history that he was re-operated on in 1911, eleven years after the original operation. There are no other data. Case II, female, age twenty-one, operated on in June, 1909, for a large mass of two years' duration, states that she has recurrence but has had no second operation. Case III, female, age twenty-one, with a small submaxillary mass in both sides operated on in May, 1910, in a curt note simply states that she has had a recurrence. Case IV, male, age forty, also had a small submaxillary mass, operated on in April, 1911, probably has a recurrence but he is quite illiterate. Case V, male, age twenty-three, operated on in June, 1911, for a large mass in the neck, states that he has a soft swelling under the scar. Case VI, female, age 21, was operated on in May, 1904. She

states that two years later a recurrence occurred which was cured after three years of X-ray treatment.

Dowd (*Surg., Gyn. and Obs.*, 1912, vol. xiv, p. 353) states that adults present a different type of lymphatic tuberculosis. "The infected lymph nodes, instead of caseating in the upper part of the neck before the lower part is involved, are apt to extend throughout the entire side of the neck so that the lower nodes become enlarged almost as much as the upper ones." He had one death in the series, apparently from pulmonary embolus.

In our cases the results may be summarized as follows:

	Cases	Traced	Cured	Recurred	Death (remote)
Infants ...	2	2	2	0	0
Children ..	49	37	32	3	2
Adults	46	28	18	6	4
Total ...	97	67	52	9	6

In four of the cured cases we performed more than one operation; in that sense they recurred but such recurrences were prompt. In at least one-half of the recurrent cases it seems probable that further operation would bring about a cure.

Inguinal Adenitis.—We observed three cases, all in males, nineteen, twenty-five and thirty-seven years old respectively. They all recovered from operation but their subsequent history cannot be learned. In one case the affection followed a "bubo," in another a scratch on the thigh had existed for three weeks previously, and in the third no cause could be ascertained.

Axillary Adenitis.—There were four cases in this series, one of which, a boy of eight, had a coincident cervical adenitis. One patient, a male, age thirty-three, ascribed the swelling to a fall on the shoulder; another, a female, age eleven, stated that it developed two months after recovery from typhoid fever; and the fourth, a female, age thirty-two, had a thecitis 19 months previously, although the axillary swelling did not appear for 18 months thereafter. All recovered from opera-

tion, the first two cannot be traced, the third was free from recurrence one year later and the fourth died of pulmonary tuberculosis five years after operation. From the subsequent history we learned that she had had a spinal caries in the interval, apparently cured by the wearing of a brace.

Etiology.—It is generally admitted that cervical tuberculous lymphadenitis represents the local deposit and proliferation of the tubercle bacillus from some lymph vessel draining a particular portal of entry. The faucial tonsils are generally considered the most frequent of these portals, followed in order of importance by the pharyngeal tonsils or adenoids, middle ear disease, carious teeth, lesions of the buccal and nasal mucous membranes and various miscellaneous causes—cracks and fissures and skin diseases, etc. The consumption of tuberculous butter or milk, the childish habit of sucking the fingers, pencils and other objects picked up from the floor, the influence of flies that deposit the bacilli on food, etc., especially in a household where some other member of the family has or has had tuberculosis or where some tuberculous person previously has lived in the house, all favor the deposition of the organisms at the portal of entry. It would be of no practical importance to enter into the controversy as to the exact percentage of tuberculous tonsils that are present in tuberculous adenitis nor to discuss whether the tubercle bacillus can pass through the tonsil into the lymph stream leaving no trace of its passage. Harbitz has isolated the tubercle bacillus from cervical lymph nodes showing no visible macroscopic or microscopic evidence of tubercle, latent infection, he terms it. That such can occur seems undoubtedly to be true and when we considered the rather widespread downward sweep of tuberculous cervical lymphadenitis in the adult and have knowledge of the termination of the lymph vessels in the blood stream we can readily perceive the danger to the individual of a tuberculously infected portal of entry or a progressive involvement of the nodes. They do not act as filters, merely as a very important part of the defensive mechanism.

The constant presence of enlarged lymph nodes in the majority of children is not so well known that the following figures from the older literature need not be repeated. Thus, Colland (*Zeitschr. f. klin. Med.*, 1893, xxiii, p. 50, and *Munch. Med. Woch.*, 1904, li, 87), in an examination of 2506 persons between the ages of 7 and 24 years, found that 94 per cent. of those between 7 and 12 years had enlarged cervical nodes. Laser (*Deutsche. Med. Woch.*, 1896, xxii, p. 500) examined 1216 school children, 1079 (89 per cent.) of whom had enlarged cervical nodes. He came to the conclusion that in 32.4–58.9 per cent. of the cases tuberculous nodes were present. In the report of the Division of Child Hygiene of the Boston Board of Health for 1911–1912 the physical examination of 118,781 school children revealed 13,711 cases of enlarged cervical glands. From these statistics, and there are numerous others, it may be concluded that swelling of the cervical nodes is very frequent and in a large number of cases that this swelling is of tuberculous origin. Now, no one supposes that all of these children develop a persistent clinical mass, probably not 2 per cent. of the Boston cases came to operation. The vast majority subside as they clear themselves of the infection. Herein lies the success of the tuberculin, hygiene and perhaps of the X-ray treatment.

Another point of practical importance has been brought out by Wright (*Brit. Med. and Surg. Jour.*, 1913, clxviii, p. 232). He states that the tonsils may become enlarged without infection or disease whenever (*a*) the first group of temporary molars at two years of age are in process of eruption; (*b*) at six years, when the first permanent molars, and at 12 years, when the second molars are active in eruption. The teeth may be diseased at these periods and be a source of infection, and enlargement of the tonsils and glands.

Pathology.—From the lymph vessel the organisms pass to a node, are arrested or destroyed there or else pass through to the next one and so on. If the resistance of the first node or nodes is sufficient there is interposed an effectual barrier, even if the node is destroyed. This is especially the case in

the child where the lymphatic tissue has great activity and explains the tendency of this disease to remain localized in children, to the upper part of the neck in the region of the first group of nodes invaded by the infecting agent. Dowd (*Surg., Gynec. and Obst.*, 1912, xiv, p. 353) remarks that 80 per cent. of his cases occurred between the ages of 2 and 17 and almost constantly this group is regular in its clinical picture; viz.: a localized mass below the parotid and either in front or behind the sternomastoid muscle. It is well that this is so when we turn our attention to the lymph paths.

Roughly, the tonsils and pharyngeal region empty into nodes that lie a little below and behind the angle of the jaw, and immediately in front of or under the anterior edge of the middle of the sternomastoid muscle. The lymphatics in front of, and above, the auditory canal lead to the preauricular nodes, and they become enlarged from any infection of the forehead, an eczema or intertrigo in the crease between the scalp and ear, a furunculosis of the anterior wall of the auditory canal, etc.; usually the infection is pyogenic, occasionally tuberculous. The central portion of the face, roughly from above the outer corner of the mouth, and from below the outer corner of the eye, drains into nodes situated about the facial artery and vein in front of the angle of the jaw; fissures and sores about the nostrils, and about the corner of the mouth and eye, and irritations within the nose may cause their enlargement. The lymphatic vessels from the lower lip and chin drain into the submaxillary or submental nodes. The scalp drains into a group beneath the occiput, and the middle ear, mastoid, and overlying tissues drain into a group under the mastoid. Infections of the gums or bone about the roots of the teeth pass from the upper jaw to the nodes at the angle of the lower jaw and from the lower jaw directly into the submaxillary nodes.

These nodes may be classed anatomically as a superficial parotid and a superficial submaxillary, the latter being so intimately associated with the deep submaxillary under the fascia as to be indistinguishable clinically; a superficial cer-

vical situated along the posterior edge of the sternomastoid muscle and a deep cervical along the course of the vessels. More extensive classification will be found in the text-books on anatomy. The terminal collecting trunk of the cervical lymphatics on the right side usually empties directly into the venous junction, occasionally as a common trunk with the subclavian lymph vessels and only rarely these two and the bronchomediastinal trunk are in junction. On the left side the jugular trunk usually empties into the terminal bend of the thoracic duct and rarely is associated with the other trunks.

Treatment.—I do not wish to be understood in this paper as making any plea for operative treatment as opposed to the use of hygiene, tuberculin or the X-ray, but I do hope to be able to present to you certain arguments showing the need of radical surgery at the right time and in the right manner. Following the dictum of the tuberculin and X-ray enthusiasts, many writers decry the use of surgery until softening has occurred at which time incision and drainage is practised or else the cavity is aspirated and filled with iodoform, formalin and glycerin. The arguments against operative treatment may be said to be grouped into two classes: First, by those who believe that recurrence, disfiguring scars, paralysis following nerve injuries, or contractures from muscle injury are of frequent occurrence; and second, by those who believe in the tolerance which the individual, especially the child, may have to certain forms of tuberculosis and the stimulation of an immunity by the tuberculous focus especially when activated by tuberculin. In addition, series of reports of cases cured or improved by tuberculin or by X-ray are often quite encouraging and the natural dread of submitting children "to the knife" popularizes these methods of treatment.

We can dismiss the mortality of operation in a few words. The extremely low mortality is surprising when the difficult nature of some of the operations is considered. We did not lose any of our patients during a period of twelve years. Judd (ANNALS OF SURGERY, 1910, vol. lii, p. 758) states

that 649 patients have been operated on in the Mayo clinic without any operative mortality although one patient died a few weeks after operation of general tuberculosis and a second died in about three months from diffuse sepsis. The older statistics of Jordan, Wohlgemuth and Blos give similar results. Dowd reports two deaths in 465 cases, one of which, an adult, was found dead in bed, probably from pulmonary embolus. Of the Mayo cases, 19 subsequently died of pulmonary tuberculosis, nine of other tuberculous lesions. Of our series, three subsequently died of pulmonary tuberculosis, one of spinal tuberculosis, and in two the cause is unknown. In the older literature Jordan among others speaks of the favorable influence of operation upon the pulmonary lesion. In one of our cases operated on eight years ago there were signs of involvement of the apices. He is now perfectly well.

The objection of the scar is well founded. No one wants a scar in any visible portion of the body and the neck scar if conspicuous marks the patient as tuberculous. But much of the talk about disfiguring scars is ridiculous. Of 53 of our patients seven complain of unsightly scars. Three of these were advanced, diffused lesions, requiring drainage for the spaces left after the dissection. In one a transverse incision with drainage lasting for some time, while it gave a bad scar, and the fifth was an easy case which healed up by first intention; some error in technic must have been the cause of the scar in this case. With this exception every easy case has a small neat scar and in twelve cases the patients declare it can hardly be seen. We are now particularly careful to sew the platysma and fascia with plain catgut and use fine worm gut, horse hair, or the subcuticular stitch for the skin. If drainage is needed we introduce a small piece of rubber tissue through a minute puncture below the scar. In extensive dissections requiring the vertical posterior incision, we drain either through a stab wound or at the lower angle of the long incision. The rubber drainage in most cases is removed in 24 to 48 hours and an attempt made to get a primary union; if necessary the pocket may be carefully

and aseptically re-opened every other day with a grooved director and the serum and lymph evacuated. Care must be taken that the throat wounds are kept clean if the tonsils and adenoids are cleaned out at the same time as the adenectomy, otherwise infection of the wound is bound to occur. Care must also be taken of the pocket under the parotid if that organ is cut, usually by sewing the gland down and by the administration of urotropin. In a few cases a severe lymphœdema has occurred, most annoying at the time and usually provocative of delay in healing. Of course, in the advanced cases with a radical dissection, some scarring is to be expected; one might just as well argue against the performance of operation for appendicitis because of the occurrence of incisional hernia, which may easily result in neglected cases when extensive drainage has been used.

As to the second point, the nerves that may be injured during the operation are the pneumogastric, facial, hypoglossal, spinal accessory, and certain of the superficial branches of the cervical plexus, especially the fifth cervical. The vagus is so deeply placed and so easily isolated that its injury is almost inexcusable. The facial trunk is also deep and even in the parotid involvement should not be touched; certain cervical fibres of the facial nerve which supply the depressor muscles of the lip are often cut, torn or crushed with a resulting slight, but deforming droop of the lower lip on that side. The nerve clings tightly to the under surface of the superficial layer of the deep fascia and if the incision is placed one-half inch below the jaw and deepened so as to carry the fascia up with the skin and muscle the nerve can almost invariably be avoided. In one of our cases I cut the hypoglossal nerve and in spite of suture a hemiatrophy of the tongue resulted. The case was advanced and very difficult but there was hardly any excuse if I had properly located the nerve. The spinal accessory is the nerve most frequently divided with permanent asymmetry of the shoulders and a scoliosis in about one-third of the cases. For this reason it should be carefully searched for and preserved. When the anterior deep

cervical nodes enlarge they are apt to dip in between the internal jugular vein and the nerve in the inch or so of its course from beneath the posterior belly of the digastric to its point of entrance to the sternomastoid. In old cases the capsule of the nodes is firmly adherent, but the nerve can generally be defined if a sufficient exposure be made by firm retraction of the muscle. In the posterior triangle the nerve crosses the space in a species of groove between the nodes and perhaps runs its greatest risk of being cut where it emerges from the sternomastoid at or slightly above the middle border of this muscle. Jacobson (*Ohio State Med. Jour.,* 1908, vol. iv, p. 9) offers an additional reason why the nerve should be preserved. The muscles of the chest are in a measure auxiliary muscles and are needed especially in pulmonary tuberculosis, and he has observed that patients with slight lung involvement do badly when the spinal accessory nerve is divided. While division of the sensory branches of the cervical plexus seems a matter of small moment, Murphy (*Prac. Med. Series,* 1906, vol. ii, p. 262) calls attention to injury of the fifth cervical nerve which produces paralysis of the rhomboid muscles, permitting the scapula to project backward. He believes it is more serious than division of the spinal accessory. In our records of 56 patients the spinal accessory was surely cut once and possibly in a second case. One patient only complains of a droop at the angle of the mouth, although I know of one other case where I cut the cervicofacial nerve but the deformity disappeared in six months. In one case, as mentioned, the hypoglossal was cut. There is no necessity for the division, removal or injury of any muscular structure unless it is hopelessly involved by the morbid process. We have entirely given up the division of the sternomastoid muscle to get more room. It seems to us, therefore, that this objection is not well founded unless one considers bad operating as a contra-indication to operation.

As to the third point, viz., recurrences, I have given our own statistics with 85 per cent. of cures in the cases traced that are living and this figure would be increased by re-

operating on three or four of the nine recurrences. Dowd, in his address before the Congress of Surgeons meeting in Philadelphia in 1911, stated that from his experience " we may fairly expect freedom from recurrences in 75 per cent. and permanent recovery in 90 per cent. of the cases." In Judd's collection of 649 cases there were 8.6 per cent. of recurrences in the region of the former operation. I am almost tempted to say that with proper technic, recurrence is impossible,—we have simply failed to entirely remove the infected nodes. Stone (*Boston Med. and Surg. Jour.*, 1912, vol. clxvii, p. 537) believes that the recurrence after radical excision is due to the failure to recognize and remove the primary foci of infection or the vulnerable points of entrance.

The Indications for Operation.—It is not easy to indicate clearly those cases which require operation and those which should be treated by other means. Judd outlines the following method of treatment:

Clear the throat of the adenoid tissue and tonsils, attend to the teeth and nose, administer tonics, especially the syrup of ferrous iodide, and advise out-door living. He believes that many of the cases in the hyperplastic stage or as Bennett would say, during the period of bacillary invasion, are cured by these measures. After caseation occurs, Judd removes the infected nodes and drains the wound. If in spite of treatment, the nodes continue to enlarge and other nodes become involved, he performs a complete excision; in the presence of a discharging sinus he curettes the softened mass, swabs the wound with equal parts of tincture of iodine and carbolic acid and when the sinus heals a radical operation is done if necessary. Stone is much more radical in his advice, he asks, " What can be gained by delay? The possibility of arrest, or if a mistake in diagnosis has been made, of cure; the probability of caseation of the entire gland to spread into the surmounting tissue, with the necessity of surgical interference under most unsatisfactory conditions, or the tedious natural discharge through a chronic sinus."

He does not minimize the value of hygienic treatment or the value of resistance, but emphasizes the fact that encapsulation of a tuberculous foci does not cure the disease which remains as a

smouldering fire ready to flare up if the proper conditions of trauma, fresh infection, or decreased resistance arise. I will summarize our own position in a moment.

Tuberculin Therapy.—There seems to be no unanimity of opinion among the writers on the treatment of tuberculous lymphadenitis as to the value of tuberculin in treatment. Various writers either support its use with intense enthusiasm or else state that the good results obtained are due to the improved hygiene, fresh air and regulated diet that are instituted coincident with tuberculin treatment.

Allen (*Vaccine Therapy, Its Theory and Practice,* London, 1910) states that "out of eight cases there is an expectation of marked improvement in five, slight improvement in two, and complete failure in one or two." Carmalt Jones (*British Medical Journal,* 1909, vol. ii, p. 531) states that out of 79 cases treated by inoculation "27 were cured, 21 made much better, 18 made better, 8 unaltered, and 4 made worse." Raw (*Lancet,* 1910, vol. i, p. 844) considers that "glands in the neck are the most favorable lesion for treatment with human tuberculin." He treated 62 cases with "very astonishing and excellent results," but the extravagance of this and other statements in his article vitiate the soundness of his observations. Hawes (*Boston Med. and Surg. Journal,* 1912, vol. clxvi, p. 80) after stating that the physician should not depend upon surgery alone, hygiene alone, nor tuberculin alone, believes that of 56 patients treated by improved hygiene, fresh air, out-door sleeping, improved diet, etc., and tuberculin, in 27 the disease was apparently cured or arrested, while in 16 others the condition of the patient was improved. I might continue to quote from various other authors more or less indefinitely but it seems to me that while I would not agree with Hawes in his belief that the so-called radical operation is comparatively rarely indicated, yet I do agree with him "that the broad-minded physician will not claim that surgery alone, hygiene alone or tuberculin alone will cure tuberculous adenitis, but he will use each and all of these three methods of treatment according to the needs of the individual patient."

The action of tuberculin is simply the production of a degree of focal reaction followed by an adequate but not excessive auto-inoculation. In the hands of those skilled in such therapy it may be used as a valuable adjunct to surgical treatment, in unskilled hands it may act as a dangerous boomerang.

Recently, Waugh (*Quarterly Jour. Med.*, 1911, iv, p. 521) in a critical review of the use of tuberculin in so-called tuberculous glands concludes "that any estimate of the value of injections of tuberculin in the treatment of enlarged glands must be invalidated by the fact that *no proof* that the glands were tuberculous can be offered until the glands have been subjected to operation." He reports that of 130 cases of presumably tuberculous glands where the tonsils were dissected out, 16 (12.3 per cent.) came to radical operation and 13 (10 per cent.) developed local abscess formation. Of 51 cases where tonsillectomy was followed by tuberculin treatment, 10 (19.6 per cent.) came to operation and 9 (15 per cent.) developed abscess; (in three cases where no primary focus existed, and treated with tuberculin, all recovered). Bennett, although he advocates its use, does not believe that tuberculin does much good and thinks that many cases of recovery are due to the improvement of hygiene and the food supply. Sutcliffe states that the cases in which apparent benefit has resulted are precisely those cases that would have recovered equally as well without it, and that the observation of children treated with and without tuberculin revealed no perceptible difference in the rate of absorption of the diseased nodes.

The X-rays.—The action of the X-ray in these cases is still uncertain because of the unfortunate habit which some radiographers have of exaggerating the "magical" properties of the rays. A number of writers have advocated this form of treatment to the exclusion of everything else, during the last few years and they habitually attack operative procedures as dangerous, disfiguring or subject to failure. But as has been said, bad surgery is not a contra-indication to operation and if a surgeon does not know how to operate for tuberculous glands in the neck he had better turn to other forms of treatment.

Pancoast (*Penna. Medical Journal*, February, 1909) in a letter to Dr. Frazier believes that while the X-ray deserves recognition as a valuable and efficient adjunct to surgery in the treatment of tuberculous adenitis, certain fundamental facts concerning its therapeutic action should be borne in mind. He believes that: (1) The X-rays have no direct bactericidal action upon the tubercle bacilli; (2) their probable action is an indirect one, a stimulating effect upon the surrounding healthy tissue cells and an increase in their nutrition; (3) the rays hasten destruction of cells of lowered vitality and the suppurative process in enlarged glands in which caseation has begun may be hastened; (4) the X-ray is a valuable adjunct to surgery in simplifying operation, preventing recurrences, promoting healing in suppurative and serious cases and greatly improving the cosmetic result.

In the application of the X-ray he arranges the cases in three distinct groups: (1) Cases in which the enlargement has not reached the operative stage. In a large percentage of such cases it is possible to check the progress of the disease by systematic and careful X-ray treatment combined with the essential constitutional measures. But it is not always possible to promote a complete absorption in some of the larger glands even though the disease process is checked because of the inability to remove the excessive degree of hyperplasia. (2) As a post-operative treatment in cases in which the glands have not begun to undergo caseation. Where operation has been limited to the removal of the large nodes, post-operative X-ray treatment may check the disease in the smaller ones. (3) As a post-operative treatment in cases in which caseation or suppuration has begun, especially in cases where sinuses have formed.

The above is an abstract and represents our own opinion and practice in advising the use of the X-ray. I would call attention, however, to the statement by Dr. Pancoast in which he refers to large nodes, etc., which have not begun to undergo caseation. This is a common error noticed in all the articles written by tuberculin and X-ray advocates and by those without operative experience. The simple hyperplastic node is a small one and when a tuberculous node becomes large and visible it will always be found to be caseous. In fact, I do not remember ever having operated upon a case of tuberculous lymphadenitis in which at least one of the nodes was not caseous.

The Manner of Interference.—I will not burden you with a detailed description of the technic of operation; we are mostly surgeons and quite familiar with the details. The description by Judd of the operation done with the long posterior incision is most thorough and should be consulted by those unfamiliar with his paper. The papers by Dowd (ANNALS OF SURGERY, 1908, xlviii, 169) describe the steps of the operation through the transverse incision. As to whether the dissection of the glands should be done by knife, dissector, scissors, or gauze will depend on the personal experience of the operator. The Mayo scissors are certainly safest and if used with skill almost as rapid in execution as is the knife. Care should be taken to avoid "spilling" the

caseous contents of the nodes and if such occurs the wound should be mopped out with Harrington's solution or tincture of iodine. Perfect hæmostasis must be secured at the close of operation, blood clots favoring wound infection. Drainage and wound closure have already been discussed.

There are two complications that deserve mention. Soft, bulging caseous masses are perhaps best treated by aspiration and the injection of iodoform emulsion and formalin, although our experience with this method has not been very satisfactory. We prefer a small incision, curettage of the cavity with gauze, thorough disinfection with Harrington's solution and drainage with rubber tissue; care should be taken that the entire cavity has been opened and that we are not dealing with a so-called shirt stud collection with an outer pocket on the deep fascia, and an inner pocket beneath. If such cavities are encountered at operation every bit of the wall must be excised. If the symptoms indicate that mixed infection has occurred, hot fomentations may make incision more easy and safe to execute, but delay is not justifiable if the infection is extending down under the cervical fascia or symptoms of general septic infection are threatening.

Where sinuses, indurated areas, and old thick scars are encountered there is no better treatment than curettage of the sinus and exposure of the neck to the X-ray. Tuberculin is of notable value in such cases and its use is based on sound reasoning.

The after treatment of these patients is of particular importance. While an operation may remove at one stroke all the infected tissue, yet the patient's resistance to tubercle infection is low and his surroundings still with him. The hygiene is of particular importance but need not be discussed here.

In conclusion I might summarize our own views somewhat as follows: After a careful history has been obtained and an examination made the portal of entry can usually be surmised and if necessary the tonsil, adenoid or carious tooth should be removed, or any ulcer, scab, pediculosis, otitis, etc.,

attended to. In those cases seen early with only a small area involved and where the child is in good general health, an operation should be advised. If the social position permits, this dissection should be confined to the macroscopic group with a minimum scar and the child sent to the seashore and kept from school for one year; the general and hygienic details of treatment being carried out with scrupulous care. In the case of the poor child or where such cannot be carried out, I think the entire submaxillary and cervical chains above the omohyoid should be excised. The general treatment must then be carried out at home. If the case is seen late with one or both sides choked up, the X-ray is often of advantage in reducing the hyperplasia and a radical dissection can be carried out at an opportune time. If caseous abscesses, sinuses, etc., exist they should be opened up, curetted out and an effort made to thoroughly clean up the tuberculous granulation tissue after which the X-ray is often invaluable in promoting healing. We prefer the transverse incision whenever possible, especially for the submaxillary and upper part of the deep cervical. When the mass has crossed posteriorly beneath the muscle or involved the posterior superficial cervical chain, an oblique incision from the posterior edge of the mastoid along the posterior edge of the muscle to just below its middle and then prolonged transversely to the thyroid muscles will give a large field area. Finally, intratracheal insufflation anæsthesia offers immense advantages in difficult cases, although pharyngeal insufflation anæsthesia suffices for the easy ones. At all times we must keep in mind that we are "not only treating a case of tuberculous glands but are dealing with a human being infected with tuberculosis. The difference between the two points of view is enormous and the success will largely depend upon the one chosen by the physician" (Hawes).

In conclusion I wish to express my indebtedness to Dr. Frazier for permitting me to collect and report his cases as well as for the privilege of using his wards for my own patients and in many instances for operating on his patients.

EXCESSIVE THICKENING OF THIERSCH GRAFTS CAUSED BY A COMPONENT OF SCARLET RED (AMIDOAZOTOLUOL).[1]

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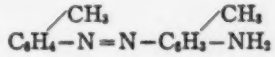
INTRODUCTION.

THERE has been some skepticism expressed at one time or another in regard to the power of epithelial stimulation claimed for certain of the organic coloring matters (scarlet red; soudan III; azodolen; pellidol, etc.), when applied locally to granulating wounds.

To my mind this matter has been settled beyond a doubt, as, during the last four years a number of enthusiastic articles have been published by well known investigators on the satisfactory use of these substances. These papers almost uniformly report splendid clinical results in hastening the healing of sluggish granulating wounds of varying etiology, and in every situation.

As is usual when a promising new therapeutic agent of this type is brought to the attention of the medical profession, it has been used by many who are not familiar with the prin-

[1] Amidoazotoluol is an amidoazo compound employed as an intermediate product, which, when combined with Beta naphthol, forms the scarlet red originally used, experimentally, by Fischer,[a] for the production of atypical epithelial proliferations; and first used, clinically, by Schmieden.[b] Amidoazotoluol was first used clinically by Hayward.[c] It has the formula—



[a] Münch. med. Wochenschr. Nr. 42, October 16, 1906, S. 2041.

[b] Zentralbl. f. Chir., Nr. 6, February 8, 1908, S. 153.

[c] Münch. med. Wochenschr. Nr. 36, September 7, 1909, S. 1836, and Deutsche Zeitschr. f. Chir. Bd. 112, 1911, S. 467.

ciples of wound healing, and who have little knowledge of surgical dressings. If unfavorable results have been obtained by such individuals, I do not believe it is entirely due to the dyestuff.

I have found that these substances will not heal every wound, but, in the majority of instances, when applied with the proper technic, they will cause epithelial stimulation in the edges of the most sluggish wounds, and give a rapid, stable healing.[2]

The use of these coloring matters has also been objected to, by some who admit their power of epithelial stimulation, on the ground that there might be the possibility of producing epithelial overgrowths having malignant characteristics. It is a well known fact that malignant degeneration may occur in any chronic ulcer, even though only the blandest dressings be used. The consensus of opinion, deduced from experimental and clinical work, is that there is no more danger of producing malignant growths by the clinical use of these substances, than with any other dressing. My own experience in the treatment of a large number of cases has convinced me of this, and I feel no hesitancy in using the organic coloring matters on proper wounds.

I take this opportunity of warning against the indiscriminate use of these substances by inexperienced persons, as considerable harm may be done with them by improperly applied, and too long continued, dressings. There is, occasionally an overgrowth of epithelium following the use of these dyestuffs, even when the greatest care is exercised, but after discontinuing the stimulating dressing, this overgrowth soon assumes the level of the normal skin.

The following case shows the epithelial stimulating power of amidoazotoluol to a remarkable degree, and may be of interest.

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[2] Johns Hopkins Hospital Bulletin, vol. xx, No. 219, p. 176; ANNALS OF SURGERY, May, 1911, p. 702; Boston Med. and Surg. Jour., June 6–13, 1912.

Clinical History.—White man, aged thirty years. Engineer. Six months before admission was severely burned in an oil explosion. The head, neck, both upper extremities and portions of the back and chest were involved, and his condition was serious. He was admitted to the Johns Hopkins Hospital in a critical condition and remained there for five months. While in the hospital skin grafting was resorted to a number of times, and considerable progress was made toward healing. He was discharged at his own request before healing was complete, and was referred to the Out-Patient Department for dressings. After several weeks his condition was unimproved, and, as the hospital was crowded, he was sent to the Union Protestant Infirmary, where he came under my care.

Physical Examination.—The patient was anæmic and emaciated. There were large unhealed areas on the scalp and on both arms and forearms. I will describe only the ulcer on the right arm, as this is the particular wound to be considered in this report (Fig. 1).

An extensive granulating wound occupied the entire circumference of the lower two-thirds of the arm, including the elbow and upper two inches of the forearm. The wound extended three inches higher on the outer than on the inner side of the arm. On the inner side an area of skin previously grafted extended up from the forearm to the bend of the elbow. The granulations were exuberant, œdematous and unhealthy. Practically all the skin of the forearm adjacent to the ulcer had been grafted before the patient came under my care. During the interval between admission to the Union Protestant Infirmary and operation on the right arm, the other unhealed areas were grafted.

The granulations of this wound were brought into healthy condition by irrigations, free use of nitrate of silver, balsam of Peru, curved scissors, etc. At the same time very marked progress was also made toward healing by stimulating the wound edges with 4 per cent. amidoazotoluol ointment, alternating every 24–48 hours with zinc oxide, or boric ointment. The newly formed skin edges were thick and stable, but showed no tendency to overgrowth. As the granulations were flat, firm and rose pink in color, in spite of the rapid stimulation of the wound edges, it seemed advisable to hasten the healing by grafting.

Operation (June 28, 1910).—Nitrous oxide-oxygen anæsthesia. A number of large thin Thiersch grafts were obtained from the left thigh by the method used at the Johns Hopkins Hospital,[3] and the grafts were spread on protective and put aside. The thigh was dressed with boric ointment on protective, and the patient was allowed to regain consciousness. The granulating area on the arm was irrigated with salt solution and then dried carefully without causing bleeding. The grafts were button-holed and applied over a large part of the unhealed area. Rubber impregnated mesh was placed snugly over the grafts, and over this overlapping strips of protective, dry gauze and a bandage.

June 30. The dressings were removed down to the rubber mesh, which was not disturbed. The grafted area was irrigated with normal salt solution and dressed with 4 per cent. amidoazotoluol ointment on old linen, over the rubber mesh. This dressing was alternated with boric ointment every 24 hours.

July 12 (after six dressings with 4 per cent. amidoazotoluol ointment). The greater portion of the grafts had taken. Since the last note there had been a remarkable gradual thickening of all the grafts. The surface was smooth but rather uneven, and of a bluish grey color. The appearance was that of an œdematous epithelial mass. The thickness varied between ⅛ and ⅜ of an inch. I felt convinced from my experience with occasional overgrowths of wound edges and other grafts caused by the organic coloring matters, that this thickening would begin to subside as soon as the stimulant should be removed. The thickened grafts were dressed with stearate of zinc powder and exposed to the air, in order to promote drying. The amidoazotoluol was discontinued. There was no excessive thickening of the wound edges.

July 20. The thickening of the grafts was still very marked, but the overgrowth had begun to separate into irregular-shaped fungating masses. When a section was removed for microscopic examination, there was little pain but profuse bleeding (Fig. 2).

July 22. Thiersch grafts from the left thigh were placed on the remaining undisturbed granulations and dressed with moist salt gauze over the rubberized mesh.

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[3] ANNALS OF SURGERY, September, 1909, p. 543.

FIG. 1.

Appearance on admission. Ulcer of right arm due to burn six months previously. Note exuberant, unhealthy granulations. Grafted skin can be seen on the forearm.

FIG. 2.

(*a*) Taken July 20, 1910. Note the marked thickening of the Thiersch grafts. The thickened grafts have begun to separate into irregular fungating masses which can be plainly seen.

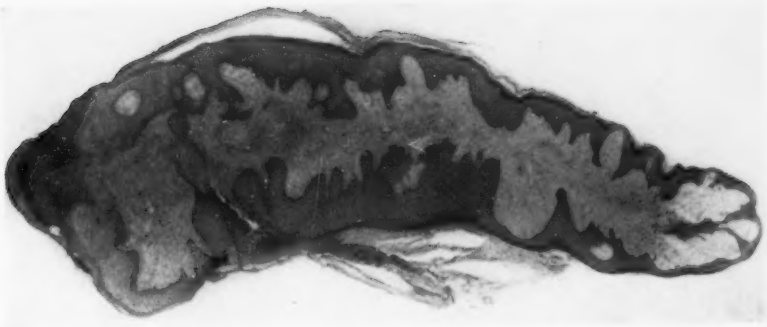
(*b*) Taken August 1, 1910. Portions of the thickened grafts have assumed the level of the normal skin. Over-growth can still be seen in other areas. Note the overgrowth which is attached only by its edges, beneath which a probe is passed. There are a number of similar areas scattered over the arm.

FIG. 3.

(*a*) Taken January 7, 1911. Five months after discharge. The skin is movable and, for the most part, smooth, although several thickened areas can be found. There is considerable pigmentation.

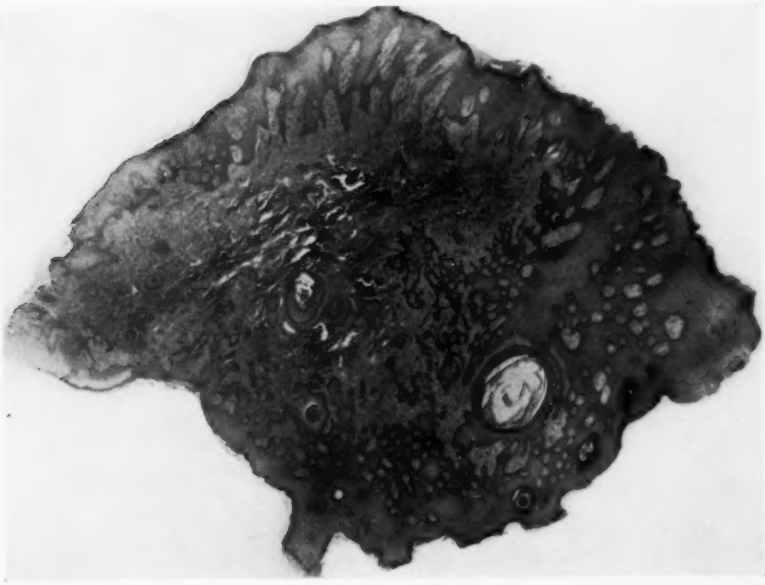
(*b*) Taken January 4, 1912. Seventeen months after discharge. There is marked blotchy pigmentation of the grafted area. On careful examination of this skin one or two small flat thickened areas can be found. There are also a few minute depressions in the skin which are filled with comedon-like masses. Otherwise the skin is normal.

FIG. 4.



Section of small papillomatous overgrowth. For description see text. (Microphotograph by Schapiro, Zeiss. Obj .AA. Oc. 3.)

FIG. 5.



Section of papillomatous overgrowth. For description see text. (Microphotograph by Schapiro. Zeiss. Obj. AA. Oc. 3.)

July 29. All the grafts last applied had taken, and *were of normal thickness,* no amidoazotoluol having been used. The first grafts had resumed, in some places, the appearance of normal grafted skin. In others, several areas had assumed a papillomatous formation. Some of these were of the size of a pea, and were adherent to the underlying clear skin by a small pedicle. Others were flattened mushroom-like masses, with overhanging edges, while other areas were adherent here and there along their edges, and not elsewhere, so that an instrument could be passed freely underneath them. Some of the thickened areas were 1½ inches in diameter, a single portion comprising about one-half of this, and the rest being made up of closely set papillæ, which extended above the surface of the skin from ⅛ to ⅜ of an inch.

Several of these areas were cut off, and normal looking skin was found beneath, except for bleeding at the points of attachment. Here and there masses of cheesy secretion could be pressed from under the overgrown areas, and this had the typical odor of the contents of an atheromatous cyst. Microscopic examination showed this to be made up of epithelial debris.

August 13. Some of the papillary overgrowths had been removed, and many others had dried out and fallen off, as the blood supply of the pedicles was gradually occluded. Those which remained were much less prominent than at the last note. A large part of the thickened grafts had assumed the level of the normal skin, which was of a pinkish color. These level areas gave no evidence of having undergone excessive epithelial stimulation.

The patient was discharged in excellent physical condition, and with practically complete healing of all his lesions.

October 15. The greater part of the grafted skin on the right arm was smooth, but here and there were scattered a few small, flat, dry, papillomatous overgrowths. These growths received their nourishment through very small pedicles, between which the formation was bridged. The patient was working at his usual occupation.

January 7, 1911. Practically all of the papillomatous growths had disappeared, and the area was covered with smooth, solid skin (Fig. 3).

January 14, 1912. The arm was covered with a stable, movable skin, which was heavily pigmentated. On careful examination one or two very small thickened areas could be found on the inner side of the arm. There were also several comedon-like masses which filled minute pockets in the skin.

January 5, 1913. The condition of the skin had not changed since the last note.

Histology.—(Microscopic examination by Dr. Joseph C. Bloodgood.[4]) (Fig. 4.) There was an oblong piece of tissue with a central zone of œdematous connective tissue surrounded by epidermis. The papillary bodies of the epidermis were present. These papillary bodies varied in size and shape; they were larger and more irregular than in the normal epidermis. In some places the hornified epithelium on the surface was more marked than normal. Corresponding to these areas the epidermis was thicker than in areas in which the hornification was less. The epidermis differed from normal in the fact that the basal cell was not so distinct in its morphology, and in places the downgrowth of epidermal epithelium was more irregular than normal. We would speak of it as atypical. In one end of the section the central connective tissue looked myxomatous or œdematous. In the faintly stained intercellular substance there were a few round and stellate connective tissue cells, resembling, therefore, myxomatous tissue. Here and there there was a lymph vessel filled with leucocytes. At the other end of the section there was a defect in the epidermal covering, and this was filled with lymphoid-cell granulation tissue. This granulation tissue grew out from a narrow isthmus in the epidermis, and projected over the surface of the epidermis, like a fungous ulcer. On each side of the granulation tissue in the defect in the epidermis, the epithelial cells were extending irregularly into the granulation tissue. The cell proliferation in the granulating tissue was of the type of the transitional and squamous cell. This histological picture was somewhat similar to that seen in the beginning of carcinoma.

The other piece of tissue (Fig. 5) had the appearance of having been cut on the bias. The central zone of connective

[4] I take this opportunity of thanking Dr. Bloodgood for the microscopic study.

tissue was smaller, the epidermis much thicker, and the section seemed to be horizontal through the papillæ rather than vertical. There were also a few cavity formations in the epidermis, filled with hornified epithelium, which had the appearance of the so-called inclusion dermoid cysts. In the connective tissue of this section, there were numerous endothelium-lined canals filled with blood, probably young capillaries, and some more dilated similarly lined spaces filled with blood which may have been veins. There were also some dilated endothelium-lined spaces which suggest lymphatics.

The entire picture, therefore, suggests unusual epithelial activity. That is, the healing process of epidermization was going on very actively; one would naturally conclude, perhaps too actively, or, as Adami would express it, "over-sufficient." The possibility of producing a definite malignant epithelial growth from such stimulation, as has been observed in X-ray and radium keratosis, should be borne in mind. This possibility is illustrated in the character of the epithelial overgrowth into the granulation tissue filling a defect in the epidermis as noted above. Here the cells were not growing as in normal epidermization in which the downgrowth was always composed first of a basal-cell layer, but, instead, the transitional and squamous cells were proliferating irregularly into the granulation tissue, as in carcinoma. But these cells as yet have not assumed the abnormal morphology seen in cancer.

REMARKS.

The microphotographs, especially Fig. 5, show a condition which resembles very closely sections of the atypical epithelial proliferations produced by injecting scarlet red oil, subcutaneously, under pressure into a rabbit's ear.[5] These experimental tumors never show a tendency to independent aftergrowth, and persist only as long as the injections are continued and the scarlet red remains in the tissues.

The epithelium of this patient seemed to be particularly responsive to the stimulation of amidoazotoluol, and these thickened grafts present the most remarkable condition of overgrowth which has come under my observation.

[5] F. H. Helmholz: J. H. H. Bull., Sept., 1907, p. 365, Fig. 2, Exp. Ia.

It is interesting to note that Thiersch grafts which were subsequently applied to unhealed portions of the same wound, under exactly the same conditions, but without being dressed with amidoazotoluol were not thickened.

There was also great thickening of the deep pinch grafts placed on the undisturbed granulations of the ulcer on the scalp, which had been treated with amidoazotoluol before and after the application of the grafts. There was no such thickening, however, of similar grafts placed on undisturbed granulations, when not dressed with amidoazotoluol. There was distinct overgrowth of epithelium, "pebbly formation," on the thigh, when the area from which the Thiersch grafts were removed was dressed with amidoazotoluol ointment. Another area on the thigh from which Thiersch grafts were taken, but which was dressed with boric ointment, showed no "pebbly formation."

The patient has been under observation for over two years and a half since his discharge from the hospital, and there is no sign of malignant degeneration anywhere.

This condition is unique, and I can find no report in the literature of a similar case. It demonstrates beyond a doubt the epithelial stimulating power of amidoazotoluol. It also seems to show that although this stimulation is excessive, there is no tendency to subsequent malignant degeneration.

EMBOLISM AND THROMBOSIS OF THE SUPERIOR MESENTERIC ARTERY.*

A REPORT OF ONE CASE.

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AND

FRED C. WATSON, M.D.,

Colon Hospital.

THE comparative rarity of this condition, the difficulty, if not impossibility, of diagnosis before operation, and the extremely high mortality are deemed sufficient reasons for the presentation of this paper.

CASE REPORT.—Case No. 28888, W.N.R. Jamaican, male, black, age fifty-eight, blacksmith; on Isthmus 30 years; admitted to Colon Hospital December 20, 1910, at 12.40 P.M.

Past History.—Patient has had a right inguinal hernia for two years and at times has had considerable difficulty in reducing it.

Present Illness.—Two days before admission a large mass descended into the right side of the scrotum. Patient says he was unable to reduce it, and paid no further attention to it until the morning of his admission to the hospital, when he felt excruciating pain in the abdomen, most marked along the right inguinal canal.

Later there were short intervals when the patient was fairly comfortable, but for the most part the pain was constant and severe. Soon after the onset of pain there was nausea and vomiting. Patient has had no movement of the bowel for two days.

Physical Examination.—Patient well developed and well nourished. Was very restless, constantly groaning, and had some hiccough. The abdomen was distended and very rigid. There was a tender mass in the right inguinal region the size of an

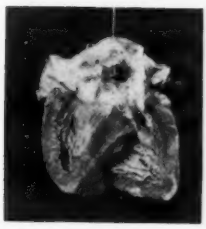
* Read before the Medical Association of the Canal Zone, January 18, 1913. (From the Surgical Clinic at Colon Hospital, Cristobal, C. Z.)

orange. An examination of the heart revealed a loud, blowing, systolic murmur best heard over the aortic region. Lungs negative. Temperature on admission was 98° F.; pulse, 108, thready. The urinary examination showed a large amount of albumin and many hyaline casts. A diagnosis of strangulated inguinal hernia was made.

Operation.—December 20, 2.30 P.M. Ether anæsthesia. Inguinal incision. There was no strangulation at either ring. On opening the sac a small coil of gangrenous gut was revealed. As the condition was plainly not due to strangulation, the incision was enlarged upward, revealing numerous similarly affected coils of small intestine. The gangrenous area involved about eight feet of the ileum, extending to within five inches of the ileocæcal valve. (The area supplied by that portion of the superior mesenteric artery distal to the ileocolic branch.) There was a sharply defined line of demarcation above and below. In many places the wall of the gut was quite thin, although no definite perforations could be demonstrated. The mesentery was thick and œdematous with its vessels standing out like firm, hard cords. The peritoneal cavity contained at least 2000 c.c. of thin bloody fluid, very offensive in odor. The peritoneum was markedly injected. There were no adhesions. The condition was evidently a hemorrhagic infarction with gangrene. The involved gut with its mesentery was resected, the edges of the mesentery were united with interrupted catgut sutures and a Murphy button anastomosis performed. The button was reinforced with a closely approximated circle of Lembert sutures. Split tubes were inserted for drainage and the wound closed. The patient left the operating room in fairly good condition, and for three days after the operation his general condition was fairly satisfactory. The temperature ranged between 99.5° and 101°. The pulse did not exceed 110. There was no further vomiting and little or no distention. On the third day there were two voluntary movements of the bowel. On the fourth day there developed marked distention and rigidity of the abdomen with hiccough and a gradual rise of temperature and pulse. The patient died at 12.30 P.M., December 24.

Upon examination of the resected area the gut was found to be gangrenous and filled with a dark bloody fluid. Numerous ulcerations of the mucous membrane were noted. The mesen-

FIG. 1.



Vegetative thrombus just above aortic valve.

tery was thick and its layers were filled with extravasated blood. The lumen of the arterial branches was completely filled with a firmly organized clot. The veins were distended, although they were not occluded. We were unable to determine whether the condition was a primary thrombosis of the superior mesenteric artery or an embolism with a secondary thrombosis. In the light of the findings at autopsy, however, we are inclined to accept the latter view.

An autopsy performed December 24, 1910, 5 P.M., four and one-half hours after death, showed the pericardial and pleural cavities to be negative. The peritoneal cavity contained a considerable quantity of pus and yellowish purulent exudate covered the visceral and parietal layers. There was no attempt at union at the site of the anastomosis and leaking had occurred. The heart showed hypertrophy of the left ventricle and some dilatation of all the chambers. Situated just above the aortic valve was a vegetative thrombus the size of a ten-cent piece. (Fig. 1.) The arch of the aorta was thickened and roughened by the presence of numerous atheromatous plaques. The rest of the aorta was similarly, though less markedly, involved. The other vessels were thickened and showed a loss of elasticity. The lungs showed a few scattered areas of bronchopneumonia in the lower lobes. The spleen was somewhat enlarged and its capsule thickened. On section two small red infarcts were demonstrated. The liver was about two-thirds the normal size, chestnut brown in color, and its surface roughened by numerous minute depressions. On section the interstitial tissue was much increased. The gall-bladder and its ducts, the stomach and pancreas, showed nothing abnormal. The kidneys were normal in size, hard and resistant to the knife. The capsule stripped with difficulty, coming off in two layers. The surface exposed was pale and granular. An occasional small cyst filled with clear, straw-colored fluid was noted. The cortex was somewhat reduced. The kidney architecture, while indistinct in some places, for the most part was good. The pia-arachnoid was markedly œdematous. In the right frontal lobe there was an area of softening the size of an English walnut.

As to the frequency of thrombosis of the superior mesenteric artery alone, Merkel [1] states that there are over 150 cases on record, fatal in nearly every instance.

Etiology.—The same factors which lead to embolism and thrombosis in general may occasion embolism and thrombosis of the superior mesenteric artery. Among the most common causes may be mentioned arteriosclerosis and endocarditis. It occurs most frequently in men past middle life.

Pathology.—According to Welch [2] the usual effect of occlusion of the superior mesenteric artery is hemorrhagic infarction of the small intestine, corresponding to the distribution of the involved vessels. The intestinal wall is thickened, œdematous, and of a dark red color, and covered with lustreless peritoneum. There is usually a sharp line of demarcation, although the margins of the infarct may pass gradually into the healthy bowel. Jackson, Porter and Quinby,[3] in their elaborate presentation of this subject, state that in three-fifths of the cases a line of demarcation is present. Their study was based upon a series of 214 cases of mesenteric embolism and thrombosis, and included practically all of the reported cases up to the year 1904. (Both arterial and venous varieties included.) In rare instances the gut may be gangrenous without typical hemorrhagic infarction. The mucous membrane may or may not be necrotic and perforations with general peritonitis may be present. The lumen of the bowel is distended with dark, tarry blood. The peritoneal cavity usually contains considerable amount of bloody fluid. The mesentery is thick and œdematous with small hemorrhages scattered here and there. In some cases the hemorrhagic extravasation may be so extensive that an abdominal tumor is simulated as in the case recently reported by Thévenot and Rey.[4] The mesenteric glands are often swollen. While hemorrhagic infarction of the small intestine is the usual result of closure of the superior mesenteric artery, the occlusion may take place so slowly that no serious effects are noted, due to the establishment of a collateral circulation. Such a favorable termination may be effected through what has been termed the "subperitoneal arterial plexus." This plexus was described by Sir William Turner [5] in 1863. It communicated on the one hand with the arteries of the ab-

dominal viscera, and, on the other, with the arteries of the different parts of the abdominal wall, such as the phrenic, intercostals and lumbar. In regard to the mesenteric vessels, he states:

"It (this plexus) passed downward between the folds of the mesentery, reaching as far as the coils of the small intestine and communicated with the branches of the superior mesenteric artery." According to DaCosta [6] an adequate collateral circulation occurs in about 5 per cent. of cases.

Symptomatology and Diagnosis.—There is no symptom complex characteristic of this condition. The diagnosis is rarely made before operation and can only be made by exclusion. Fortunately the indications for an exploratory operation are so imperative that such a refinement is unnecessary. Eisendrath [7] says it must be differentiated from the various forms of intestinal obstruction, perforations of gastric and duodenal ulcers, acute cholecystitis or appendicitis associated with acute peritonitis and the rare condition of angina sclerotica abdominis. Shoemaker [8] also includes acute pancreatitis, lead or renal colic, torsion of tumors and referred pain from pneumonia or pleurisy, especially diaphragmatic pleurisy. The condition most closely simulated is intussusception. Intussusception in 56 per cent. of cases occurs in children from the fourth month to the tenth year or in young adults,[9] while embolism or thrombosis of the superior mesenteric artery usually occurs in men past middle life and in those presenting evidence of cardiac or vascular disease. Intestinal hemorrhage is common in both, but it is more apt to be profuse in the embolic cases. A swollen and tympanitic abdomen is rare in the early stages of intussusception, while it occurs in nearly one-half of the cases of embolism.[3] In intussusception a tumor is more often demonstrable. Ordinarily the disease begins in one of two ways: (*a*) This form closely simulates intestinal obstruction with or without general peritonitis. It is characterized by sudden, agonizing abdominal pain, which is usually generalized and paroxysmal. Nausea and vomiting quickly follow and there is absolute

constipation. If the occlusion in the artery is high up the vomitus may consist entirely of blood. The abdomen is much distended, tender and rigid. (*b*) This form is characterized by a predominance of the symptoms of intestinal hemorrhage. The patient is greatly prostrated, there are severe colicky pains and frequent bloody stools. In the early stages the symptoms of intestinal paralysis are usually less marked. In addition to these generally accepted and more common types there is a chronic form characterized by a more insidious onset and which may give rise to a large blood tumor between the layers of the mesentery. This form must be differentiated from cysts of the mesentery and other abdominal tumors.[10] According to Gerhardt [11] a typical case of embolism or thrombosis of the superior mesenteric artery should present the following features: A source for the embolus, profuse intestinal hemorrhage unaccounted for by a lesion of the intestinal wall or obstruction to the portal circulation, the characteristic paroxysmal pain, ileus and the presence of fluid in the abdomen, a rapid fall in the temperature, and the presence of a large palpable mass between the layers of the mesentery.

Prognosis.—In rare instances a collateral circulation may be established and spontaneous cure take place. Of the series reported by Jackson, Porter and Quinby,[3] 47 were subjected to operation and only 4 recovered, giving a mortality of 92 per cent. With an early exploratory operation the mortality may be materially reduced.

Treatment.—If the patient's general condition is good and there is present a sharp line of demarcation, a resection of the involved area with immediate intestinal anastomosis—preferably by a lateral method—would seem to be the ideal method of procedure. If this is impossible on account of a less favorable condition of the patient and there is no well-marked line of demarcation, a resection with the establishment of a temporary artificial anus would be the method of choice. Peritonitis as a complication should receive appropriate treatment.

We desire to thank Col. W. C. Gorgas, Chief Sanitary Officer, Isthmian Canal Commission, for permission to publish this paper.

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THE CAUSE AND TREATMENT OF CERTAIN UNFAVORABLE AFTER-EFFECTS OF GASTRO-ENTEROSTOMY.*

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As a result of modern improvements in technic, the unfavorable complications, which were formerly not infrequent after gastro-enterostomy, have become more and more rare. It must, however, have been the experience of almost every surgeon that patients, upon whom a gastro-enterostomy had been performed, have at some later period complained of symptoms, which were often trivial in comparison with those of the condition for which the operation was carried out, but which were none the less sufficient to prevent the patient from regarding the result of the operation as entirely satisfactory. In the last few years I have been consulted by a considerable number of such patients, at intervals varying from a few weeks to several years after the operation, which had been performed for various conditions, but most commonly for duodenal ulcer. I have gradually come to recognize that the symptoms in a considerable proportion of the cases are due to a cause which has not hitherto been described, and in others are the result of a condition which has, up to now, only been incidentally referred to by Jonas,[2] in 1908. These two conditions, which I propose to discuss more fully in this paper, are in my experience considerably more common than is the recurrence of ulceration in the duodenum, the closure of the stoma or the formation of jejunal or gastrojejunal ulcer. They occur, of course, in only a small proportion of all the cases operated upon. I have seen about twenty cases, which have been operated upon by almost as many different sur-

* Founded on a paper read before the Surgical Section of the Royal Society of Medicine, February 11, 1913.

geons; they therefore represent a very small percentage of cases in the practice of each individual surgeon. They are, none the less, of considerable importance, as their recognition and treatment often results in the conversion of a comparatively unsuccessful case into a completely successful one.

1. *Too Rapid Drainage of the Stomach.*—The patient complains of a sensation of fulness, which occurs during each meal, and which may be so unpleasant that the amount of food taken is progressively diminished and a considerable loss of weight may finally occur. The sensation disappears rapidly, and the patient may find that by eating with extreme slowness he is able to prevent its occurrence. Many patients recognize that this sense of fulness is localized slightly lower than the position where the pain or discomfort, for which the operation was performed, was felt.

In some cases the patient also complains of slight diarrhœa, the bowels being opened after each meal; the first stool passed in the day is generally solid, but the later ones are unformed and occasionally fluid. In rare cases the diarrhœa may be severe, and a case which has been reported of a patient dying from diarrhœa after gastro-enterostomy was probably of this nature, no organic cause having been discovered at the autopsy.

In all patients suffering from this group of symptoms I have found with the X-rays that the stomach was small and hypertonic and that the passage of food out of it was extremely rapid, so that a meal, consisting of half a pint of porridge and milk mixed with two ounces of bismuth oxychloride or barium sulphate, left the stomach in less than an hour, and in one case in less than ten minutes after being taken, instead of requiring the normal three or four hours. If the patient is watched whilst he is taking the meal, the outflow from the stoma may indeed appear to be almost as rapid as the inflow from the œsophagus (Fig. 1). In all cases little or nothing passed through the pylorus, and sometimes the chyme even failed to reach the portion of the pyloric end of the stomach beyond the stoma. The rapidity of escape through the stoma

does not depend upon the condition of the pylorus, as I have seen more cases in which the pylorus was left patent at the operation than cases in which the pylorus was obstructed as a result of disease or by the surgeon in the course of the operation. Indeed, the most marked case I have ever seen was one in which the stomach was completely empty less than ten minutes after a bismuth meal was begun, and the pyloric passage had actually been widened by means of pyloroplasty at the second operation, which was performed on account of persistence of the symptoms before I saw the patient.

The rapid passage of the gastric contents through the stoma leads to distention of the proximal part of the jeju-

FIG. 1.

Five years after gastro-enterostomy for small duodenal ulcer, which did not produce obstruction.

num in a way which never occurs normally, as the duodenum and end of the ileum are the only parts of the small intestine which are ever full under natural conditions. I believe this distention of the jejunum is the cause of the sense of fulness, as the experiments described in my Goulstonian Lectures proved that distention, which leads to stretching of the muscle-fibres, is the only adequate stimulus of visceral sensation. In confirmation of this, the situation of the sensation is found to be lower than that due to gastric distention, and corresponds to the upper limit of the situation of the pain felt when the small intestine is subjected to rapid distention. The patient sometimes finds that anything which increases the activity of

the small intestine, such as exercise or a dose of castor-oil, though it may increase the discomfort, makes it disappear more rapidly than it would otherwise, doubtless because the distention of the jejunum lasts for a shorter period.

Confusion with the symptoms arising from a jejunal or gastrojejunal ulcer is prevented by the fact that the nature of the diet has a considerable influence on the latter, whereas, in this type of this post-operative indigestion, the quantity and not the quality of the food is alone of importance.

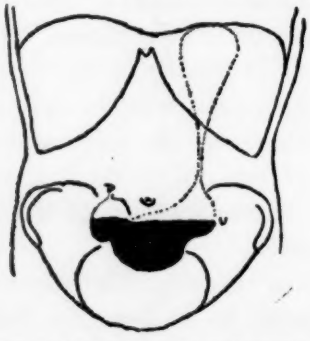
The diarrhœa is mainly due to the irritation of the bowels by the food, which escapes from the stomach too rapidly for efficient gastric digestion; owing to the absence of the normal stimulation of pancreatic secretion by hydrochloric acid in the duodenum it does not undergo sufficient compensatory digestion in the intestine. It tends to occur after meals owing to the normal gastrocolic reflex, which I have shown leads to an increase in the peristalsis of the colon whenever food enters the stomach.[1] In all probability there is also an enterocolic reflex, which arises from distention of the jejunum and produces the same result.

Complete relief or considerable improvement occurs if the patient is instructed to lie down for half an hour or an hour after each meal, as it is found with the X-rays that the stomach empties itself much less rapidly when this posture is assumed, the stoma no longer being in the most dependent position. In some cases it is better to lie on the right or less frequently on the left side, the best position being easily ascertained by watching the rate of evacuation with the X-rays. The patient should also be given some active preparation of pancreatic ferments, such as pankreon, at each meal, in order to compensate for the deficiency of the normal secretions. If the sense of fulness is still experienced, in spite of the treatment I have described, small doses of belladonna, which causes the involuntary muscle-fibres of the intestines to relax, and of codeine, which diminishes the excitability of the visceral nervous system, should be given half an hour before meals.

If all treatment fails to give relief and the patient's symptoms are severe, it might perhaps be necessary to perform an operation with the object of diminishing the size of the stoma, or, if the pylorus is not obstructed, of restoring its activity by completely closing the stoma. The interesting question also arises whether surgeons have not gone somewhat too far in their desire to obtain sufficient drainage, and whether it would not be advisable in the future to make a somewhat smaller stoma than has commonly been made in the last few years.

2. *Situation of the Stoma above the Upper Level of the Gastric Contents.*—In cases of extreme dilatation of the

FIG. 2.

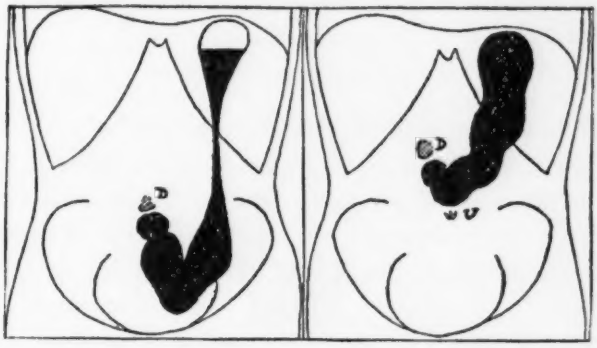


Pyloric obstruction due to duodenal ulcer; dilatation and hypertrophy of stomach. *P*, pylorus *U*, upper level of gastric contents.

stomach I have, on a number of occasions, observed that in the vertical position the whole of the gastric contents accumulate in the lowest part of the stomach in such a way that their upper limit is below the pylorus, and may not even reach the lesser curvature (Fig. 2). In such cases nothing at all can leave the pylorus, however strong peristalsis is, until the patient lies down. It is clear that in such cases an effective gastro-enterostomy must have the stoma so situated that it remains in the most dependent part of the stomach even when the vertical position is assumed. When the stomach is extremely dilated it must be exceedingly difficult to judge at an operation which will be the most dependent part when the vertical position is assumed, as, quite apart from any dilata-

tion, the influence of posture on the position of the stomach may be remarkably great (Fig. 3). Fortunately, the rest in bed and the strict diet after the operation are a great safeguard; whilst lying down the stomach drains quite satisfac-

FIG. 3.

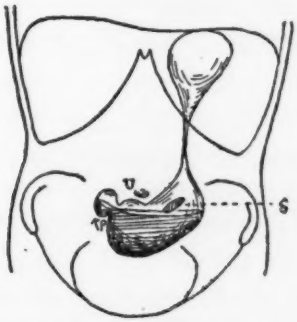


Vertical position. Horizontal position.

Gastroptosis. *D*, duodenum; *U*, umbilicus.

torily through the stoma, and consequently regains a great deal of its tone. I have, however, seen one case of dilated stomach due to simple pyloric obstruction, in which no im-

FIG. 4.

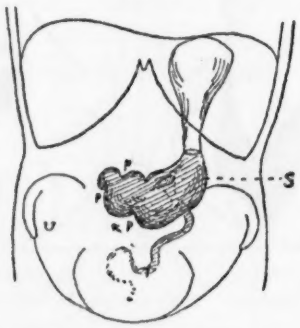


Gastro-enterostomy for pyloric obstruction. Stoma above the upper limit of the gastric contents in the vertical position. *U*, umbilicus; *P*, peristaltic waves; *S*, stoma.

provement resulted from operation, and in which we found that in the vertical position the upper limit of the gastric contents did not reach as high as the stoma or the pylorus (Fig. 4), but that on compressing the lower part of the abdo-

men the contents rose above the stoma and at once began to pass out of it (Fig. 5). By supplying the patient with an abdominal support and making him lie down for an hour after meals on his left side—the position in which I found that the drainage was most rapid—complete relief was eventually obtained. A somewhat similar case has been described by Jonas.

FIG. 5.



Same case as Fig. 4, with abdomen compressed so that the gastric contents can pass out of the stoma.

I believe that the notorious absence of success of gastro-enterostomy, when performed for severe atonic dilatation of the stomach without organic obstruction, must be due to a similar cause, drainage through the stoma being mechanically impossible.

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RECTUS TRANSPLANTATION FOR DEFICIENCY OF INTERNAL OBLIQUE MUSCLE, IN CERTAIN CASES OF INGUINAL HERNIA.*

BY WINFIELD SCOTT SCHLEY, M.D.,

OF NEW YORK,

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THE desirability of including muscle in the suture of abdominal wounds in addition to fascial and aponeurotic structures, not only to secure as broad a union as possible but to counteract the stretching of the union of fascia and aponeuroses, has long been recognized in guarding against hernial separation.

From time to time patients with the inguinal variety of hernia present themselves in whom the internal oblique muscle is markedly deficient; in some the transversalis fascia at the base of Hesselbach's triangle is thin to the point of obliteration as well, and when the external oblique aponeurosis is divided three or four fingers can be pushed into the abdomen, invaginating the atrophic transversalis fascia, properitoneal tissue, and peritoneum. The protrusion at the internal ring may extend for several fingers' breadth toward the pubes, thinning out the ligamentum inguinalis mediale of the transversalis fascia and possibly even extending to the inner vertical fibres. The transversalis aponeurosis, normally deficient for a short distance above Poupart's ligament in the region of the inguinal canal, is not only thin but narrow in these cases. It can rarely, if at all, be utilized in the Bassini operation.

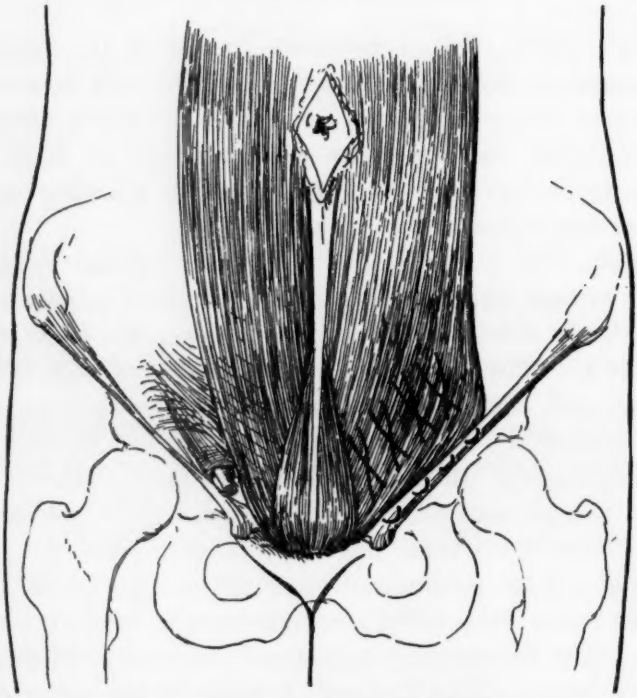
A discussion of the anatomy of the inguinal region is hardly in place at this date when the so-called conjoined tendon is so generally recognized as a myth, as far as its usefulness in the Bassini operation is concerned, and the internal oblique recognized as our mainstay, forming as it does so much of the anterior wall of the inguinal canal. Even the transversalis

* Read before the New York Surgical Society, April 23, 1913.

muscle, except in sutures placed well out toward the internal ring, is not included in the repair.

While many hernial recurrences take place through the internal ring rather than through the transversalis fascia as a direct hernia, a sufficient number do recur in this way to make the support of this weak area, internal to the transplanted cord, especially important in those doing heavy manual labor

FIG. 1.



Deviation of fibres of rectus (after Bloodgood).

and in whom the internal oblique muscle is insufficient for adequate protection. Not a few of these cases with weak transversalis fascia and large herniæ have, nevertheless, a good internal oblique, quite sufficient for the Bassini operation without embellishments. Some of them have not. On the other hand, there are those with but moderate sized herniæ who are markedly deficient in oblique muscle, there being scarcely more than enough to insert the external suture of

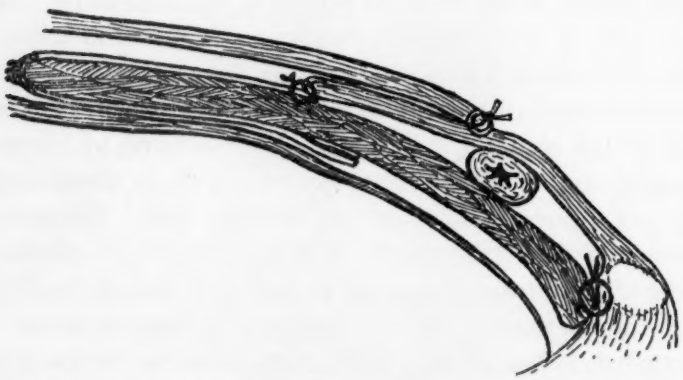
Coley beyond the cord. For these cases, a few only of the total number (Bloodgood states as high as 7 per cent.), the transplantation of the nearby muscle of the rectus has served extremely well.

The literature upon the subject of rectus transplantation is not voluminous and in it but little distinction has been drawn between the different anatomical conditions and the operative procedure most applicable to each. The procedure, usually spoken of in this country as Bloodgood's and published by him in 1898, is not altogether of this late date. Bassini, in his original communication in 1890, recommended suture of the lower border of the rectus to Poupart's ligament in the two or three sutures taken nearest the pubes. Wölfler, in 1892, reported in *Billroth's Festschrift,* 51 of 58 cases done by a complicated technic of his own in which the cord was transplanted back of the rectus, the internal oblique sutured to Poupart's ligament, and lastly the rectus drawn out of its sheath anteriorly and sutured to Poupart's ligament as well. This anterior opening of the rectus sheath weakens the internal attachment of the already sutured internal oblique if it be well developed. The transplantation in his cases as a routine seems unwarranted, as the internal oblique was sufficient for the typical Bassini. The recurrences were about 5 per cent. Bloodgood more recently has opened the rectus sheath from behind, obviating this disturbance of the internal attachment of the muscle. Slajmer, in 1898, reported 150 cases done by a modified Wölfler method without cord transplantation. After freeing the layers his outer two sutures bring the internal oblique to Poupart's ligament, the next two the outer part of the anterior sheath of the rectus and the rectus muscle edge to Poupart's ligament and the external oblique fascia, and the last two the inner edge of the rectus sheath and external oblique fascia. Two final sutures close the external ring. This method is open to much the same objection as the preceding. The recurrences were about 4 per cent. The adaptation of the rectus transplantation to the Halsted operation was Bloodgood's, and in 14 cases, of an early communication,

where it was done in the presence of obliterated transversalis fascia, there were no relapses at the lower end of the wound, while 62 per cent. of similar cases done by the Halsted operation alone recurred. Its adjuvant effect in this operation is therefore marked, when indicated.

We have the choice of a number of operative procedures, depending upon the anatomical condition and based upon or combined with the Bassini operation. In the presence of a good internal oblique muscle, its internal attachment is weakened if the rectus sheath is opened anteriorly, and this is

FIG. 2.



Schematic diagram of arrangement of rectus and external oblique fascia.

contra-indicated both in direct and in indirect herniæ; for the indirect, the straight Bassini is sufficient, and for the direct many times as well. In *deficiency* of the internal oblique, rectus transplantation with or without utilizing the remaining portion of the oblique, as an additional Bassini, is of assistance both in direct and indirect herniæ. In moderate-sized indirect and direct herniæ with marked oblique deficiency, the rectus sheath may be opened anteriorly and the muscle transplanted in a manner I wish to speak of later, and that has proved very simple and most satisfactory in some 12 cases. In the larger herniæ indirect and direct with oblique deficiency, we have but scanty structures to interpose, and rectus transplantation is at its maximum of usefulness. The sheath

should be opened behind the attachment of the internal oblique and transversalis aponeurosis, and the muscle brought down to Poupart's ligament, what is left of the internal oblique sutured to the ligament as well and the external oblique fascia over all. In all cases, where there is *sufficient* internal oblique muscle to use internally to the transplanted cord, it seems wiser to open the rectus sheath from behind, and bring the muscle down behind the oblique. In marked deficiency of the oblique, little or no harm results from opening the sheath in front.

Downes, in a number of these cases of direct hernia and of hernia recurring after operation through the transversalis fascia, has done this combined operation; Blake, at a somewhat earlier date, as well. The Mayos, in similar cases, have utilized what remained of the internal oblique and sutured this together with external oblique aponeurosis well down on the sloping shelf of Poupart's ligament, the outer half of the external oblique muscle and fascia overlapping the line of union and the internal half. They do not expect over 1 per cent. recurrence. Halsted has turned down a flap from the anterior sheath of the rectus. Berger, in 1902, did the same. The use of muscle tissue in addition to aponeurotic structure seems the method of choice.

Transplantation, or transposition, of the lower part of the rectus muscle does not markedly alter the direction of its fibres, or result in tension on suturing, if an adequate opening be made in the sheath. Furthermore, as remarked by Russell, the new relations of the rectus formed materially aid in maintaining its new position. The method I have followed in some 12 cases of indirect hernia, with markedly deficient internal oblique and weak transversalis fascia, has been to first utilize what remains of the oblique muscle, usually only that part external to the internal ring and transplanted cord, by inserting Coley's stitch. The rectus sheath was opened for three inches a quarter of an inch from its edge, the incision beginning below the insertion of the aponeurosis of the remaining good oblique, the muscle loosened from its sheath and drawn down to the thoroughly cleaned shelving edge of Poupart's ligament by four No. 2 or

3, 14-day chromic sutures. The cord lays upon this bed. The outer half of the external oblique aponeurosis is sutured to the internal half of the rectus sheath. This overlaps the line of union of muscle to Poupart's ligament and closes over the rectus muscle. The inner half of the external oblique aponeurosis is drawn down over the line of union of the outer half with the rectus sheath with a few mattress sutures. Externally, one or two sutures of chromic gut bring into close apposition the cut edges of the aponeurosis.

Adequate rest in bed of 20 to 21 days seems proper in all hernia operations, the function of sutures being to bring tissues into apposition for union without strangulation and not to take the mechanical strain which the tissues themselves are capable of doing when properly united by first intention.

All the cases done by this method were heard from or seen over a year later, and a few two years after operation, with the exception of four done since the first of January who were seen within the last week, and repair has been apparently perfect in all.

The various procedures utilizing the rectus muscle have a definite usefulness and indication in a certain number of cases, where the operation is made to fit the condition and not the condition to a typical operation, however good that may be.

RECURRENCE OF INGUINAL HERNIA.

BY A. J. HULL, F.R.C.S. (Eng.), Major, R.A.M.C.,
OF LONDON.

A FEW years ago it was the practice of surgeons when considering the advisability of operating for the radical cure of inguinal hernia, to point out that the operation "only put the clock back" to the conditions of affairs which existed previous to the development of the hernia.

This view is no longer generally held. Surgeons who believe in the presence of an abnormal process of peritoneum being the sole cause of hernia, will, if they follow their belief to its logical conclusion, believe that efficient treatment of the sac will invariably cure the hernia. There is no doubt, however, that hernias treated by efficient ligature of the sac and an additional plastic operation upon the inguinal canal do recur. It is probable that the high percentage of failures published in some statistics is due to the fact that many cases treated by obsolete methods of operating were included and that if a large number of cases could be traced which were operated by modern methods of performing the radical cure the results would show that the operation is one of the most certainly successful in surgery—I am inclined to this view by the fact that I have rarely found that a typical Bassini operation with displacement of cord has been performed when operating for recurrence of hernia after operation.

An examination of the methods of recurrence of hernia will guide us to the most satisfactory operation for its radical cure. The type of relapse is found to follow accurately the type of operation originally performed.

1. If the sac has not been ligatured or sutured sufficiently high up, the hernia rapidly recurs in the sac.

2. Cases operated upon as follows: *a*. Opening inguinal

canal; *b.* ligature of neck of sac; *c.* suture of conjoined tendon over cord to Poupart's ligament.

Recurrence takes place often a year or more after the operation. The hernia appears to the inner side of the internal ring and pushes forward the parietal peritoneum and transversalis fascia.

A section of the inguinal ring shows the weak spot left by this operation. A tent-like space is found by the conjoined tendon stretching across the cord. The internal ring is not constricted. Out of fifty-seven cases of recurrent hernia which have come under my observation, 45 followed the operation indicated above. Hernia to the outer side of the internal ring or direct hernia does not follow this operation.

3. Cases operated upon as follows: *a.* Opening inguinal canal; *b.* ligature of neck of sac; *c.* suture of conjoined tendon beneath cord to Poupart's ligament.

The internal ring is efficiently constricted. Recurrence is rare after this operation and when it occurs it occurs to the outer side of the internal ring.

The case operated upon by the writer recurred four months after operation. Only seven out of fifty-seven recurrences had been operated upon by this method.

4. Cases operated upon by ligature of the sac alone.

Relapse usually follows by a protrusion of the parietal peritoneum through the internal ring, which has not been constricted by the operation, or appears to the inner side of the internal ring.

5. Cases operated upon by ligaturing the neck of the sac and displacing the ligatured neck by buried sutures.

In this method the weakest point of the abdominal wall is transferred from one point to another. Normally the internal ring is the weakest point and if the neck of the sac be displaced outward and a typical Bassini operation performed, the weak point becomes the area immediately to the outer side of the internal ring. The procedure of displacing and burying the neck of the sac is probably one of the most valu-

able steps in the operation for radical cure of hernia, provided the sac is displaced to the safest possible place, which is above the internal ring.

6. Cases of hernia treated during childhood.

The treatment of hernia in children by trusses frequently effects a temporary cure, a cure which is followed by a relapse sooner or later, when the strain of adult work begins.

From a consideration of the modes of recurrence the following points appear to be necessary in the operation for hernia: *a.* Transposition of the neck of the sac; *b.* constriction of the internal ring; *c.* strengthening the weak area of the posterior wall of the inguinal canal to the inner side of the internal ring. In the typical Bassini operation this is done by suturing the conjoined tendon to Poupart's ligament; *d.* obtaining adequate pressure upon the internal ring; *e.* strengthening the weak area to the outer side of the internal ring.

In the following operation which I now perform and which has been adopted by my colleagues, the above points are embodied.

The inguinal canal is opened by dividing the external oblique over the canal from the external ring to well above the internal ring.

The coverings of the spermatic cord are lifted with two pairs of forceps and divided between the forceps by a knife the edge of which is lateralized.

The sac is recognized and separated from the constituents of the cord. The neck of the sac is carefully isolated by stripping structure adherent to it by wiping it with dry gauze. The sac is transferred and ligatured as high up as possible, the ligatures are left long and one of the ends is threaded through a needle the point of the needle protected by a finger is passed through the internal ring and brought out through the entire thickness of the abdominal wall, with the exception of the skin about one and a half inches above the internal ring. The other end is treated in the same way and the ends tied together.

The next step is to constrict the internal ring and strengthen the posterior wall of the inguinal canal. This is done by separating the two muscles forming the conjoined tendon and having lifted the cord, suturing the transversalis muscle and conjoined tendon to Poupart's ligament.

The internal oblique is now sutured over the cord to Poupart's ligament, commencing about one inch and a half to the outer side of the internal ring.

By this step the area to the outer side of the internal ring, where relapse occasionally occurs, is strengthened, adequate muscular pressure is obtained over the internal ring and the pressure of the transversalis which now forms the posterior wall of the inguinal canal is reinforced. The spermatic cord now passes between the two muscles which form the conjoined tendon and a recurrence of hernia along the cord is efficiently prevented. It is rarely necessary to lessen the size of the cord by removing some of the veins and coverings. Fishing gut sutures are employed for these deep stitches, the knot is tied three times and the ends cut short. No after trouble appears to occur from the use of these hard and unabsorbable sutures —I have used kangaroo tendon in many cases but consider ordinary fishing gut a better suture.

The inguinal canal is closed by suturing the divided aponeurosis of the external oblique.

CONTRACTURE OF THE PSOAS PARVUS MUSCLE SIMULATING APPENDICITIS.*

BY GEORGE R. WHITE, M.D.,

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AMONG the cases operated upon for appendicitis there are a certain number in which the removal of the appendix does not relieve the symptoms, and the patients have no abatement of pain and tenderness in the right iliac fossa after the operation. There are several causes assigned for continuance of the pain, including adhesions, Jackson's veil, ptosis of the colon, and functional neurosis. After some observations, extending over about five years, it is my belief that contractures of this psoas parvus sometimes occur, simulating chronic appendicitis and keeping up trouble after the appendix has been removed.

The first case that called my attention to this condition was a patient of Dr. M. L. Currie, of Vidalia, in his hospital, in November, 1908. The history is briefly as follows:

CASE I.—Mrs. O. P., thirty-eight years, married, no children. Well nourished and not of a neurotic temperament. About a year previously she began to have shooting pains and tenderness in the right iliac fossa, which gradually got worse. Six weeks ago the pain was so great she was obliged to take to her bed, where she has remained. She was not constipated, there were no digestive disturbances, and there was never any fever. Examination showed the four classical symptoms of appendicitis—rigidity of the right abdominal muscles, localized pain, excessive tenderness over McBurney's point, and a distinct tumor in the region of the appendix, which could not be well defined on account of rigidity and excessive tenderness. A diagnosis of appendicitis was made. At operation the appendix was found to be small, soft and apparently normal in every way. The mesentery was

* Read before the Georgia Medical Association, April 16, 1913.

long and there were no adhesions about the caput coli, nor anything that would indicate an inflammatory process in that neighborhood. The tumor, which we had felt before the operation, was found to be a tense band of fascia along the inner side of the psoas magnus, attached to the borders of the upper lumbar vertebræ and below to the pelvis.

An opening was made through the posterior parietal peritoneum and the band cut. So great was the tension it snapped loud enough to be heard by the assistants. Additional bands of fascia running through the psoas magnus were incised and all tensions relieved. The patient made an uneventful recovery, and went home two weeks after the operation.

A letter from Dr. Currie, dated March 28, 1912, three and a half years after the operation, states that relief was complete and permanent.

The next case occurred about two years later.

CASE II.—January 19, 1911, B. W., twenty-seven years, married, three children. Patient is a healthy country woman, not of a nervous temperament.

Two years ago, about two months before confinement, she was taken with a sudden severe pain in the right iliac fossa. It partially subsided in a few minutes, but the side remained painful and tender. After delivery the pain gradually increased and became so great that she has been an invalid for the past year and a half, spending most of her time in bed. The pain, which starts from the right iliac fossa, extends down the leg, up to the shoulder, and sometimes to the opposite side. She walks bent over, and lies on the right side with the legs drawn up. She has indigestion and is constipated, but has had no fever.

Examination shows a flaccid abdomen with no rigidity of the muscles. There is a tumor in the right iliac fossa, which could not be palpated satisfactorily on account of extreme tenderness. The pelvic organs were negative. The right kidney is movable. Passive motion of the leg is painless. From experience with the previous case, the diagnosis was made before the operation. The appendix was found normal with no evidence of inflammation in the neighborhood.

The psoas parvus was found in a state of contracture and projected forward into the abdominal cavity, resembling a tumor. The main tendon together with several accessory bands were

incised, relieving all tension. Immediate relief followed the operation. She went home in about two weeks and was able to get about with some degree of comfort.

August 11, 1911, she returned and the floating kidney was anchored. A letter dated March 27, 1912, states that she was greatly benefited by the operations and is now enjoying good health, and is able to do her work.

In spite of experience with the two cases mentioned above, in the third case, which occurred over a year later, the diagnosis was not made and the symptoms relieved until the third operation had been performed.

CASE III.—October 19, 1911, P. C., fourteen years old, well nourished and not neurotic. In August of this year she began to have shooting pains in the right side, which gradually increased in severity until October 1, when she was confined to bed with a severe pain. There was no constipation, no fever, and no disturbance of digestion.

Examination showed the four classic symptoms of appendicitis; namely, rigidity of the right rectus muscle, localized pain and tenderness in the right iliac fossa, and a tumor. She was operated upon and the appendix removed, but obtained no relief. January 26, 1912, the pain was so great she was again operated upon for adhesions. No adhesions were found and the operation afforded no relief. The pain gradually got worse after the operation, and began shooting down the leg.

March 21, 1912, after several examinations, each showing an indefinite tumor in the right iliac fossa, she was operated upon the third time for contracture of the psoas parvus tendon.

The tendon was exposed retroperitoneally through the usual appendicitis incision, and was found to be very tense, with several bands of fascia running through the psoas magnus. The main and accessory tendons were cut, and all tension relieved.

Relief from pain in the side was prompt. She was able to walk about the room in ten days, and when seen May 1 the side was absolutely free from pain, and she was enjoying good health.

In the fourth case the patient was a neurasthenic and in the absence of any other discoverable cause, the condition might be considered a neurosis.

CASE IV.—T. L., single, sixteen years, Jewess. Patient is of a decided nervous temperament and is employed as a telephone exchange operator, a work that exaggerates her neurotic tendencies.

February 21, 1912, while at work she was taken suddenly with a pain in the right side so severe that she fainted. She was taken home and during the next two days suffered intense pain in the right side of the abdomen and down the leg. Vomiting took place soon after the attack and continued at intervals during the next day. There was no rise of temperature. Examination when first seen, three days after the attack, showed great rigidity of the right abdominal muscles, exquisite tenderness over McBurney's point, and an ill defined tumor in the right iliac fossa.

The operation disclosed a perfectly normal appendix, but a tensely contracted psoas parvus muscle. This was cut retroperitoneally with immediate relief.

She was examined April 1, 1912. The side was neither painful nor tender, and she was going about with comfort.

March 4, 1913, the patient was seen again, complaining of pain in the left side, which came on suddenly while at work, and was severe enough to keep her in bed. There was no fever and no digestive disturbance. Examination showed tenderness in the left iliac fossa, rigidity of the left abdominal muscles and a mass in the left iliac fossa, which was diagnosed a contractured psoas parvus. She was seen by Dr. Walter Wilson and Dr. Walter Norton, who confirmed the diagnosis. March 6 she was operated upon the second time. The tendon was exposed retroperitoneally, and was found to be in a state of tense contracture, projecting forward almost like a knife blade. It was incised, relieving all tension. Recovery was uneventful. She left the hospital on the twelfth day, and when seen last, April 13, she was feeling well, and ready to go to work.

This is the only case in the series in which marked involvement of the left tendon has been observed.

CASE V.—April 17, 1912, Mrs. S. E. A. The patient is sixty-nine years old and shows the effects of her years. She suffers from indigestion, constipation and neuralgia. Twelve years ago she began to have attacks of pain in the right iliac

fossa with neither nausea nor fever. She was seldom entirely free from pain, and at times it became very severe.

Examination showed rigidity of the right rectus, tenderness over McBurney's point, and a tumor about the size of a finger.

The operation revealed a small sclerotic appendix with adhesions, which may have been a factor in causing the trouble. The psoas parvus fascia was in a state of contracture, and projected forward into the abdominal cavity, simulating a tumor.

The main and accessory bands of fascia were cut retroperitoneally and all tension relieved. There has been no pain in the side since the operation, though indigestion and neuralgic attacks continue.

CASE VI.—June 12, 1912, A. W., forty-two years. The patient has had rheumatic pains in various parts of the body the past year. For the past month the right side of the abdomen has been painful and tender, with pain increased by movement, so that she was confined to bed most of the time. She was constipated and had severe vomiting spells.

Examination showed rigidity of the right abdominal muscles, tenderness over McBurney's point, and rigidity of the psoas parvus muscle. The muscle in the left iliac fossa was rigid but to a lesser extent.

At operation the appendix was found in a normal condition. The right psoas parvus was in a state of tense contracture and was incised, relieving all tension. The patient was relieved from pain immediately, and was able to return home in two weeks.

CASE VII.—Sept. 11, 1912, M. J., twenty-six years. The patient has had a pain in the right side for about eight months, sometimes quite severe. Two weeks ago she had an attack which confined her to bed. She is now feeling better, but the right side is painful and tender.

She is not neurotic and there have been no digestive disturbances and no fever. Examination showed a floating kidney. The abdominal muscles were relaxed and a tense band felt in the right iliac fossa.

The kidney was anchored, the appendix was removed, though it was apparently normal, and the psoas parvus tendon cut.

She made an uneventful recovery, and went home in two weeks.

Besides these marked cases, the condition has been observed in a minor degree and associated with floating kidney, chronic appendicitis, and Jackson's veil, but the tension was apparently not great enough to produce symptoms.

In these seven cases the pathological conditions were practically the same. The psoas parvus tendon was under considerable tension, which was not relieved by an anæsthetic and caused the tendon to project forward toward the abdominal cavity, simulating a tumor when felt through the abdominal walls.

Regarding the etiology and pathology of the condition, I know nothing. Spastic muscular contractures in various parts of the body are well known, those of the neck being the most common. They are usually attributed to functional neurosis, organic disease of the nervous system, syphilis, or rheumatism. Contractures in this locality are not discussed in available literature. All I can find is the following:

Writing upon muscular contractures in *Die Deutsch Klinik,* Remark dismisses the subject by the statement that clonic and tonic spasms of the ileopsoas and rectus femoris without assignable cause, have been reported in neurasthenics by Klemperer, Koch and others.

The psoas parvus, according to the books, is an inconstant, rudimentary muscle, attached above to the last dorsal and first lumbar vertebræ, and below to the ileo-pectineal line of the pelvis. In these seven cases the muscle was represented by a band of fascia, extending along the inner borders of the psoas magnus, and receiving fibrous bands from each of the neighboring vertebræ. The function of the muscle in the lower animals is to bend the pelvis on the spine, a motion almost lost in man. It is not surprising that this muscle, which is undergoing retrograde evolution, should take on some pathological condition, and the excessive pain from its contracture may be accounted for by the fact that the attachments are to relatively fixed structures, so that the tension cannot be relieved by flexion of the parts.

An analysis of the cases shows that pain, tenderness and

apparent tumor were present in all cases. The pain came on suddenly in two, gradually in five; it was limited to the side of the abdomen in five, and was referred to the leg in two. Four with extreme tenderness showed rigidity of the abdominal muscles on the right side, but this was probably a voluntary act. Fever was not present in any case, and the digestive disturbances seen in two of the patients were probably coincidents and had no relation to the trouble. One of the patients was markedly neurasthenic, the other six were not.

The differential diagnosis from appendicitis is difficult or impossible in cases of short duration, with the four classic symptoms of appendicitis present.

Long-continued severe pain in the right iliac fossa with a marked tumor, but without fever and without digestive disturbances, would indicate trouble other than appendicitis. However, it is not essential that the diagnosis should be made before operation, provided the condition is recognized, if present, as soon as the abdomen is opened. The presence of a tense tendon along the edge of the psoas magnus renders diagnosis easy through an exploratory incision.

The treatment consists in cutting of the tendon and all tense bands, which may be done either transperitoneally or retroperitoneally, preferably the latter, since by working retroperitoneally the peritoneum serves as a retractor in keeping the intestines out of the way. The glistening tendinous fascia may be picked up with a clamp and cut, also all tense bands of accessory tendons. The common iliac artery is well out of the way inside of the tendon, and the nerves are beneath the large muscle, and to the outer side, so no important structures are liable to be injured.

The results of the operation have been entirely satisfactory thus far, the relief being immediate and lasting.

THE REDUCTION OF THE FRAGMENTS PRELIMINARY TO INTERNAL SPLINTAGE IN CASES OF FRACTURE OF THE LONG BONES.

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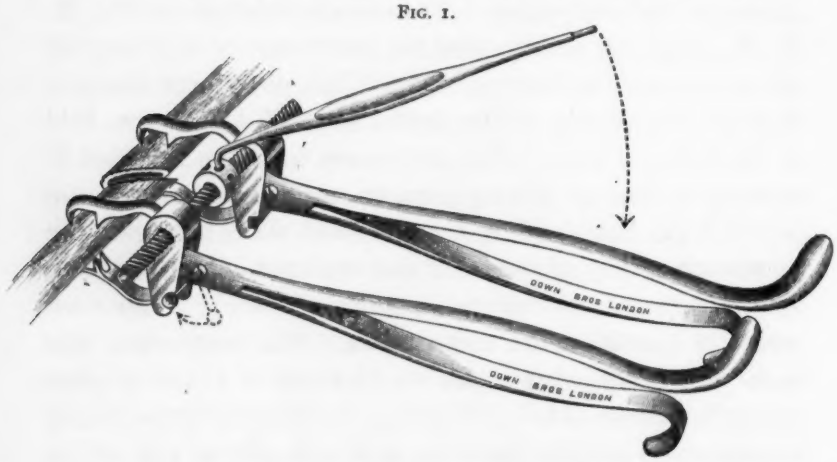
IN ANNALS OF SURGERY, November, 1912, p. 769, Gerster publishes an interesting article on "The Reduction of the Fragments in Fractures of the Long Bones." The need for some mechanical device to effect reduction has long been felt. During the operation great difficulty is often experienced in reducing and maintaining the fragments in correct alignment while a Lane's plate is applied and this is particularly the case in fractures near the middle of the shaft of the femur of some weeks or months duration, so much so that occasionally after repeated attempts at reduction have failed it is necessary to remove portions of the ends of the bone in order to obtain correct apposition. Although much can be done by extension applied immediately in recent cases and particularly by employing Jones' method with a Thomas' knee splint, there still remain a certain number of cases in which the result is bad. The requisite care in nursing may not always be attainable and in outlying districts medical aid may not be so easily procured as in towns. Such cases come to operation. During the operation much of the force used in producing extension is applied through the knee-joint and sometimes synovitis is set up. The procedure is the reverse of elegant and is excessively tiring to the assistants. When operation is performed in the house occupied by the patient there may be difficulty in finding supports for any pulley extension such as the operator is accustomed to use in his own theatre. These considerations led me in October, 1911, to devise an apparatus that would help to render reduction easy. It was clear that the method should involve applying the force of separation as a

direct interaction between the fragments themselves. In principle the apparatus was similar to Gerster's turnbuckle. At first it was arranged that one end of the extension screw should pass through a hole bored centrally through the joint of one of the bone-holding forceps, while the other end passed either through a similar hole in the other, or in front of or behind this hole according to the relative positions of the fragments; but it was found that this arrangement, though readily causing the separation of the fragments, failed in affording easy alignment and coaptation. I am much indebted to Mr. H. W. M. Gray for having tried the instrument at this stage in one of his cases on Jan. 24, 1912. This instrument was also shown at the meeting of the British Medical Association, held at Liverpool in 1912. The instrument was then modified in such a way that the sliding piece on one end presented a slot in which the bone-holding forceps could slide, but again the comparative fixity of the other end rendered adjustment both of the fragments and of the instrument difficult, because the forces in operation are considerable. The instrument was again modified so that a slot was formed in each end piece and each was provided with a hasp so that the bone-holding forceps could be shut into the slot without the risk of its coming out during the progress of extension. This instrument (Fig. 1) is applied in a similar manner to Gerster's, that is to say, extension is carried out as far as possible by ordinary means without using undue force and the fragments are seized with Lane's bone-holding forceps applied parallel to each other and as near together as possible. The pieces on the screw are then adjusted equally from the middle to fit the distance between the forceps and the instrument is lowered over the forceps so that the slots engage them and the hasps are closed up. The handles of the forceps are held one in each hand by an assistant and the screw is turned by the operator until the full extension has been produced. Coaptation being thus secured is maintained, if necessary, by using a third bone-holding forceps to grasp the fragments. At this stage it

may or may not be convenient to remove the extending instrument according to the case. The plating is now proceeded with. The instrument affords the following advantages:

First, it is applicable to all the ordinary bone-holding forceps of the Lane type in general use, so that no additional or special forceps need be provided. By using a Lane forceps much room is gained in the wound for manipulation of the plate because the bows of the Lane forceps afford ample room for inserting the plate and screws while the forceps are still

FIG. 1.



in position. The great desideratum in these operations is more room in which to work without increasing the size of the wound.

Secondly, it is not necessary to interrupt the process of extension and change the apparatus. The length of screw provided is sufficient for all ordinary cases in which the fragments have been separated as far as possible before the forceps are applied. In many cases the instrument will not be required, such as recent cases in which extension has been employed from the first. Such cases are treated by open operation because of the difficulty of securing proper attention when external splints and extension are used. At operation complete reduction is easily obtained, but occasionally it may be helpful to have the instrument at hand. In cases in which

an additional fragment or splinter is present there will be comparatively little difficulty if the case is recent and anæsthesia profound, but if the condition is of old standing the difficulty may be very great indeed and the instrument will be required. It is clear that there is a call for an instrument of this kind because two surgeons have independently designed one, and since both have employed the same principle in its construction it is probable that this principle is the best. At the present time it seems to me to be open to question whether further refinements are necessary or advisable. It is possible to add a ratchet wheel to the middle of the screw bar and to apply over it a boxed ratchet spanner which greatly hastens the process of reduction. But the more simple thing seems to me to be the best, until such time as it is shown to be inefficient by reason of the extension occupying too much time. It is also open to question whether such extension is not safer when it is performed slowly so that the tissues may be stretched and not ruptured. The method is simple, gentle, and entirely efficient.

FRACTURES THROUGH THE TROCHANTERS OF THE FEMUR.*

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Sir Astley Cooper was the first to classify intelligently the typical fractures of the upper end of the femur. He distinguished three species:

"First, that in which the fracture happens through the neck of the bone entirely within the capsular ligament (Fig. 1).

"Secondly, a fracture through the neck of the thigh-bone at its junction with the trochanter major; which is external to the capsular ligament (Fig. 2).

"Thirdly, when the bone is broken through the trochanter major, beyond its junction with the cervix femoris" (Fig. 3).

He further states, in speaking of the second variety, "It frequently happens in this injury that the fracture of the neck of the thigh-bone is complicated with an injury of the trochanter major and trochanter minor." In other words, he recognized the fact that fracture of the neck *at its junction with the trochanter major is only an uncomplicated form of fracture through the trochanters;* or, to put it a little differently, that *fractures through the trochanters usually are comminuted* and often are combined with fracture of the neck at its base. The three illustrations here reproduced, sketched from Cooper's plates, show what he regarded as typical fracture lines.

From Cooper to Amesbury, Lonsdale, and Malgaigne; from Malgaigne to Hamilton; and from Hamilton to Stimson and Cotton, the description of these fractures became more complex, and their interpretation more difficult and their classification less lucid. Nothing of importance was added to Sir Astley's description, and though subclasses were formed

* Read before the Philadelphia Academy of Surgery, April 7, 1913.

this served only to render the comprehension of the subject more difficult for the student.

Amesbury, under the general heading, "Fracture of the Trochanter Major," says: "Occasionally, fractures of the trochanter major pass through the femur, so as to divide the neck of the bone and the trochanter from the shaft, these two parts remaining naturally connected. In these cases, the fracture is situated between the trochanter minor and the lower part of the root of the neck, sometimes taking one direction, and sometimes another." He quotes a case from Guthrie (*Med.-Chir. Trans.*, vol. xiii) in which autopsy showed, as the result of a heavy fall on the hip, a fracture external to the capsule; the little trochanter was broken

FIG. 1.

Fracture through the neck, entirely within the capsular ligament (Cooper).

FIG. 2.

Fracture through the neck of the thigh bone at its junction with the trochanter major (Cooper).

off and with it the attachment of the psoas and iliacus. The head and neck were separated from the shaft by a diagonal fracture, extending from the upper and outer part of the trochanter major to the trochanter minor, so as to leave the insertions of the pyriformis, gemellus, obturator externus and internus, and quadratus, with the head and neck. He also quotes a case of Syme (*Edinb. Med. and Surg. Jour.*, vol. xxv) in which post-mortem examination showed the capsular ligament entire, but two fractures beyond—one detaching the neck where beginning to spring from the shaft, the other running obliquely downward and inward through the trochanters, so as to detach the posterior part of the greater and the whole of the lesser trochanter in one piece from the body of the bone.

Lonsdale describes fractures of the great trochanter thus: "The direction the fracture takes varies very much; it most frequently, however, extends so as to include a portion of the neck of the bone and of

the trochanter minor, at the same time splitting the two trochanters from one another, and allowing of the neck of the bone being wedged in between the two; in which position it is often so firmly fixed that it is impossible to make extension sufficient to unlock the portions of bone from one another. The wood cut represents the kind of fracture." (Fig. 4.)

Malgaigne, with his fondness for refinements in classification, speaks thus of extra-capsular fractures:

FIG. 3.

Fracture through the trochanter major (Cooper).

FIG. 4.

Fracture through the great trochanter (Lonsdale).

"The *type* is at the base of the neck; but two sufficiently rare varieties are when the fracture is (1) just internal to the typical site (partly intra- and partly extracapsular); (2) just external or below. This second variation from the type is much the more important—the result is that the fracture essentially divides the great trochanter, which becomes part of the upper fragment. *But it is excessively rare* for such a fracture to be single; the multiple (*i.e.*, comminuted) fractures are *incomparably more common.* And of these comminuted fractures there are two main types: (1) The great trochanter is fractured as well as the neck, and constitutes a *third fragment* (the more common type); (2) the lesser trochanter is fractured also (as well as the great trochanter and neck) and forms a *fourth fragment.*" Other rarer types, he adds, are (1) Where the third fragment is formed by the lesser trochanter alone, the greater trochanter being part of the upper fragment; (2) where the great and lesser trochanters are united in the same fragment; (3) those where the greater trochanter alone is comminuted. He writes (p. 714), when speaking of sub-trochanteric fractures, "when the fracture is very close to the lesser trochanter, it is often enough comminuted and combined with an extracapsular fracture"; but his classification, while more elaborate, is much less easily comprehended than that of Sir Astley.

Hamilton made the explicit statement, when describing extracapsular fractures, that "almost invariably the acetabular penetrates the trochanteric fragment in such a manner as to split the latter into two or more pieces."

Cotton is rather diffuse when writing of "Fractures Through the Trochanters." He adopts a pathogenetical classification, dividing them into fractures by *direct violence* and those by *torsion of the leg.* "The lesions in the torsion fractures often show a combination of a torsion fracture (with spiral lines) through the trochanters, combined with a fracture between the neck of the femur and the intertrochanteric line. Breaks *directly* across," he adds, "between the level of the greater and lesser trochanters are rare; they are from direct violence usually. Such lesion may accompany a break at the base of the neck, perhaps from splitting of the trochanteric neck by this basal fragment." Torsion fractures, he says, may break the bone above or below the lesser trochanter; but these fractures clinically belong with those wholly below the trochanters. Speaking in a footnote of fractures below the trochanters, Cotton adds (p. 480), "Many fractures do not anatomically fall either in this class or in class 5" (fractures through the trochanters). He says (p. 488) fractures of the lesser trochanter often occur as a complication of spiral or splintering fractures.

Stimson prefers the terms "fracture through the neck" and "fracture at the base of the neck" to describe the "intracapsular" and "extracapsular" fractures; for the former he also uses Kocher's term "fractura subcapitalis," but thinks the term "fractura intertrochanterica" is not acceptable for the latter. For Kocher's term "fractura per-trochanterica" Stimson uses the term "fracture through the great trochanter and neck." Of fracture at the base of the neck Stimson writes (p. 360): "The line of fracture follows ordinarily the junction of the neck and shaft quite closely—that is, it coincides with the spiral line in front and the intertrochanteric line behind as they pass between the great and lesser trochanters. It may extend downward and detach the lesser trochanter from the shaft, leaving it attached to the neck, or go even lower and separate a part of the shaft. . . . In the majority of cases other lines of fracture traverse one or both trochanters, splitting off one or two pieces, usually from the posterior surface of the great trochanter, or comminuting it completely."

In discussing fractures through the great trochanter and neck (*fractura per-trochanterica* of Kocher), Stimson says it is an uncommon injury, and that few specimens are known; he has seen only one case himself, and there the fracture was *atypical.* In typical cases, he says, the "upper fragment is formed by the head, neck, and upper part of the great trochanter." He thinks the mechanism probably is forcible extension or abduction, with avulsion of the shaft from the upper fragment which is held by the Y-ligament. (This is what Ross would call a "sprain-fracture," because the fragment is torn off by ligamentous action.)

Stimson says there are 12 cases on record of *isolated fracture of the lesser trochanter;* as 9 of these have been reported since 1908, and were recognized by skiagraphy, it is probably more common than formerly thought.

Now it may be asked by the unprejudiced observer (and such usually is the medical student), "What is the use, and where the sense, in describing as *typical* a type of fracture *through the trochanters* which is *extremely rare,* and most cases of which are 'atypical'; while we regard as *atypical* a form of fracture which is quite common?"

My object in preparing this note on *fractures through the trochanters of the femur* is to call attention to this very fact; that the fracture usually considered typical is so rare that it should be considered atypical; while the "atypical" fractures, so-called, are comparatively very frequent.

Some years ago I had occasion to make a collection of skiagraphs of "typical fractures." My search through the many thousands of negatives stored at the Episcopal Hospital enabled me to find at last one skiagraph which corresponded to what is described in modern text-books as a *typical fracture through the trochanters.* I reproduce that skiagraph here as Fig. 9. I was struck with the great infrequency of the type, and began to keep my eyes open for other examples of fractures through the trochanters of the femur. Last autumn one of our resident physicians at the Episcopal Hospital asked me whether fractures of the lesser trochanter of the femur were not excessively rare. I replied that isolated fractures of the lesser trochanter might be, as I did not recall having seen any; but that at the time we were speaking there were in Dr. Frazier's wards in the Episcopal Hospital no less than four fractures through the trochanters of the femur, involving separation of the lesser trochanter. And inasmuch as it did not seem that the frequency of this injury was generally recognized, I thought it might be worth while to bring the subject before you to-night. I include in the series of cases two patients from Dr. H. C. Deaver's service at the Episcopal Hospital. Thus there are *six cases of fractures through the trochanters of the femur* in one hospital in a period of six months. This fact alone is testimony to the frequency of this "atypical" type.

The only surgeon since the times of Cooper and of Lonsdale who seems to have had a just appreciation of these

fractures through the trochanters is V. Zachary Cope. He has recently written a most valuable article on "Impacted Fractures Through and Near the Femoral Neck." He insists on the frequency of impacted fracture of the neck at the head, from violence directly applied over the great trochanter; and on the frequency of impacted fracture through the base of the neck and the trochanteric region, which, as he says, "includes all those which used to be loosely called 'extra-capsular fractures of the neck.'" He says: "The cancellous tissue of the great trochanter is split up by a firm wedge of bony tissue belonging to the cervix femoris. This wedging of the cervix into the trochanter region is responsible for two or three secondary fractures which frequently complicate the primary breakage."

Cope describes three grades of injury:

(1) A primary fracture occurs at the junction of the head and neck, and the base of the neck is then thrust into the cancellous tissue of the great trochanter, with secondary but incomplete fracture through the great trochanter.

(2) The firm tissue of the neck causes separation of the fragments of the trochanter along the lines previously mentioned. The tip of the great trochanter nearly always is drawn inward toward the upper rim of the acetabulum. This grade of injury he considers to be the most common type of fracture resulting from a fall on the hip.

(3) A further stage, when the small trochanter and a slice of the shaft are also split off.

He concludes that fracture of the base of the neck is always primarily impacted; and if the force applied is great, there are always secondary fractures, both vertical and horizontal, through the trochanteric region.

The conclusion of the whole matter, as it seems to me, brings us back to the classification of fractures of the upper end of the femur originally formulated by that greatest of teachers of surgery, Sir Astley Cooper. His facilities for observing the actual lines of fracture were confined to the post-mortem table; and zealously did he employ his opportunities. Our facilities, thanks to skiagraphy, are unlimited. But all that we have since learned merely confirms the justness and accuracy of his original observations. The typical fractures of the upper end of the femur are:

1. Fractures through the neck (Sir Astley's own term,

adopted by Stimson, the highest contemporary authority on fractures). Fig. 5 is typical; not impacted.

2. Fractures where the neck joins the trochanter, or at the base of the neck. Fig. 6 is typical; impacted. This skiagraph also shows an impacted fracture of the neck at the head, emphasized as frequent by Zachary Cope. The impaction of the neck into the trochanter connotes an incomplete fracture of the trochanter.

3. Fractures through the trochanters, which, as taught by Cooper, are typically comminuted and combined with fracture of the neck at its base.

(*a*) The *uncomplicated form,* as taught by Cooper, or the *first grade of injury,* as described by Cope, is represented by impacted fracture at the base of the neck, already enumerated (Figs. 6, 8, and 9).

(*b*) A more advanced grade is represented by partial comminution of the great trochanter (Fig. 9).

(*c*) The most advanced grade, and what may be regarded as the typical fracture through the trochanters, involves injury of both trochanters, usually with some comminution (Figs. 10, 11, 12, 13, 14, and 15). Figs. 16 and 17 may also be added, though verging on the next type (subtrochanteric).

4. Fractures below the trochanters. Typical of the transverse type is Fig. 7. The oblique type verges into that last described (Figs. 16 and 17).

CASES OF TYPICAL FRACTURES OF THE UPPER END OF THE FEMUR.

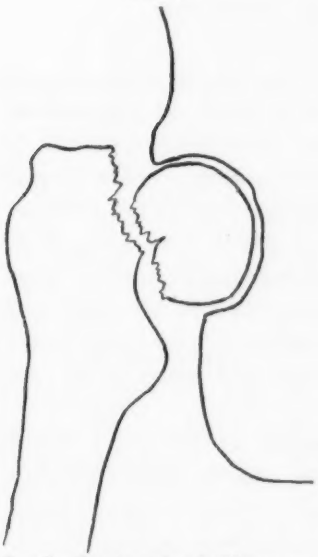
CASE I.—*"Intracapsular" Fracture of the Neck* (Fig. 5).—Mrs. Ellen G. was a woman aged forty-five years. Her neighbors accused her of being a drinking woman, and of having suffered at times from delirium tremens. One night she imagined she was being pursued, and jumped out of the second story window of her home. Apparently nobody paid much attention to her, as she returned to her room, seemingly unhurt. Later during the same night she jumped a second time out of the second story window, and was so unfortunate this time as to injure her right hip. She was brought to the Episcopal Hospital, and admitted to Dr. Frazier's service, January 3, 1913.

The right lower extremity was markedly everted, and was 2 cm. shorter than the left. There was a fracture of the neck of the right femur. Both knees were contused, and the left wrist was contused.

For the first week after admission she suffered from delirium tremens, at times verging on *mania a potu*. Then there was an interval of two weeks of calm. Then, on January 25, she developed acute cholecystitis; this subsided in three or four days under palliative treatment.

The fracture was treated by longitudinal traction, by Buck's

FIG. 5.



Case I.—Fracture of neck of femur near head (typical) (January 13, 1913).

FIG. 6.

Case II.—Impacted fracture at base of neck of femur (January 27, 1913). Impacted fracture of neck at head present, but not shown in this tracing.

extension apparatus, with lateral traction to the upper portion of the thigh. Owing to her delirious state this could not be very efficient at first.

February 24. Out of bed.

March 11. Walks all around ward, with very little support from crutches. Shortening 1.75 cm. Flexion of hip to 100 degrees and abduction possible for about 15 or 20 degrees.

CASE II.—*"Extracapsular" Fracture of the Neck, Impacted* (Fig. 6).—Jo M., thirty-eight years of age, was a Polish man, who did not talk any English. He came to Philadelphia from Brooklyn, looking for work, and while engaged in this

occupation slipped and fell down a few steps. He says he doesn't remember what made him slip, or how he landed. He was brought at once to the Episcopal Hospital, and was admitted, January 26, 1913, to Dr. Frazier's service. The left lower extremity was more everted than the right, and he was unable to flex his thigh on the pelvis. There was 1 cm. shortening; the great trochanter was just above Nélaton's line. There were also fractures of the left radius (impacted Colles's), and of the mandible (compound).

Buck's extension was applied, with very little weight, as the skiagraph showed an impacted fracture at the base of the femoral neck, and it was not desired to disturb this.

March 8. Extension removed.

March 11. Shortening 1.5 cm. Flexion possible to 140 degrees (about); no abduction possible; limb in the longitudinal axis of the body, and in slight permanent external rotation.

CASE III.—*Fracture Below the Trochanters of the Femur* (Fig. 7).—John M. G. was thirty-nine years old. On October 12, 1912, he was at work in a house which was being torn down. He was stooping forward and engaged in tearing loose one of the floor boards when he heard a click in his thigh and then fell down and found he was unable to rise again. He was brought to the Episcopal Hospital and admitted to the service of Dr. Frazier.

There was complete loss of function of the right lower limb; it was rotated outward, there was 2.5 cm. shortening, but the great trochanter was not displaced upward. Inward rotation was not possible.

The limb was put on an inclined plane, between sand-bags, in slight abduction, and with weight extension (in longitudinal axis) of 15 pounds. Some union was apparent at the end of a week. On October 31 a new Buck's extension apparatus was applied.

November 25. Walking about ward on crutches.

November 27. Discharged.

March 17, 1913. Returned for examination, 5 months after injury. The patient walks without noticeable limp, and complains of no disability. The shortening is 2 cm. There is flexion of the hip to 70° (20° beyond a right angle with the trunk); rotation and abduction are normal.

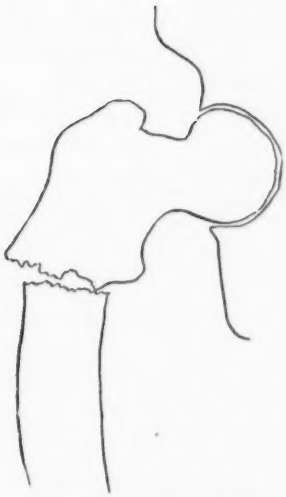
This patient had complained of pain in his femur for three

weeks before it broke; and for two days previously, he says, he had a sense of false motion at the point where the fracture subsequently occurred. Examination revealed no constitutional cause predisposing to fracture; but the appearance of the femur in the skiagraph is not normal.

TYPICAL (?) FRACTURES THROUGH THE TROCHANTERS OF THE FEMUR.

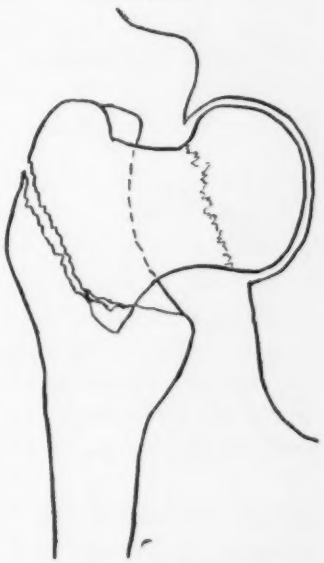
CASE IV.—*Fracture Through the Trochanters of the Femur (Incomplete)* (Fig. 8).—Rachel B. was fifty-five years old.

FIG. 7.



Case III.—Fracture of femur below trochanters (typical) (October 12, 1912).

FIG. 8.



Case IV.—Fracture through trochanters of femur (impacted). Impacted fracture of neck at head (August 10, 1910).

Walking along the street one day, she had the misfortune to step on a banana peel. She fell and hurt her right hip. She was helped home, and lay there incapacitated for a week. Then she was brought to the Episcopal Hospital and admitted August 9, 1910, to the service of Dr. H. C. Deaver. There was eversion of the lower extremity, and slight shortening.

Buck's extension apparatus was applied, with sand-bags for lateral support.

September 6. Up in chair.

September 25. Walking around ward all day.

October 8. Discharged.

CASE V.—*Fracture Through the Trochanters of the Femur (Complete)* (Fig. 9).—Thos. A., sixty-five years old, slipped on the icy pavement February 21, 1903. He was brought to the Episcopal Hospital and admitted to the service of Dr. G. G. Davis. There was pain, swelling and crepitus in the region of the great trochanter of the left femur. There was marked eversion of the entire lower extremity. Shortening was not noted.

Buck's extension was applied, with a sliding splint to prevent rotation of the lower extremity.

April 7. Weights removed.

April 14. In chair.

April 23. Discharged, walking on crutches.

FIG. 9.

Case V.—Fracture through trochanters of femur. Impacted fracture of neck at base (February 24, 1903).

FIG. 10.

Case VI.—Fracture at base of neck of femur (impacted); with separation of lesser trochanter (August 9, 1912).

FRACTURES INVOLVING THE LESSER TROCHANTER OF THE FEMUR.

CASE VI.—*Fracture of the Lesser Trochanter and Impacted Fracture of the Neck at its Base* (Fig. 10).—James O'R., forty-eight years old, was thrown off the running board of a trolley car ("summer car"). He landed on his left hip. He had severe pain, and was unable to rise. He was lifted from the street, placed on a chair, and removed to the Episcopal Hospital in a patrol wagon. He was admitted August 4, 1912, to the service of Dr. Frazier. There was great pain in the left hip; the

limb was everted, and inversion gave excruciating pain. He was unable to invert his leg voluntarily. There was 2 cm. shortening, and the left trochanter was about 2 cm. higher than the right.

Buck's extension and sand-bags were applied.

August 8. Shortening was 2.5 cm. A Volkmann's sliding splint was applied to the foot, to prevent rotation, and outward lateral traction (6 lbs.) was applied to the upper portion of the thigh, with the longitudinal traction increased to 15 pounds weight. The patient was allowed to sit up in bed.

August 20. Lateral traction discontinued.

August 24. Weight on longitudinal traction gradually diminished.

August 28. All weights off. Every morning since first week thigh has been flexed and slightly rotated, while traction was maintained.

August 29. Massage ordered.

September 9. Shortening 1 cm. Active flexion of hip to 135°.

October 5. Discharged.

March 17, 1913. Returns for examination. There is a moderate limp, and patient complains of pain and stiffness in joint. He has done no work since his accident. But it should be noted that he has not yet secured an award of damages for his injury. There is 1 cm. shortening; flexion of the hip is possible to 75° (15° more than a right angle), abduction only to 8°, while rotation is normal.

CASE VII.—*Fracture of the Lesser Trochanter, with Partial Fracture of the Neck at Base* (Fig. 11).—Amelia L., seventy-two years of age, tripped over the carpet as she walked across her room, and fell heavily, striking her left hip on the floor. She was unable to move, and was not moved until taken to the Episcopal Hospital in the ambulance. She was admitted September 12, 1912, to Dr. Deaver's service. On admission she was lying on her right side, with thighs flexed, and seemed comfortable in that position. When she was turned on her back, the left hip and knee were flexed, and the left lower extremity rotated outward. It could be rotated inward, but this caused moderate pain. When the limb was fully straightened it appeared to be shorter than the right.

Buck's extension was applied, with longitudinal traction, and sand-bags.

September 26. Lateral outward traction was also applied. Patient has frequent asthmatic attacks.

October 13. Patient died suddenly (within five minutes), apparently from cerebral embolism.

CASE VIII.—*Fracture of the Lesser Trochanter with Fracture Through the Trochanters* (Fig. 12).—Charles H. M., seventy-four years old, was struck by a falling scaffolding, which he thinks caught him in the back, throwing him on his face. He was picked out of the wreckage in an unconscious condition, and

FIG. 11.

Case VII.—Fracture of femur through trochanters, with separation of lesser trochanter (September 23, 1912).

brought to the Episcopal Hospital, where he was admitted, December 1, 1912, to the service of Dr. Deaver.

On admission he was conscious, but badly shocked. Vomited several times after admission. There were swelling and spasm of the muscles of the left thigh; the limb was in external rotation; 1 cm. shortening was present; slight crepitation around the hip-joint, with preternatural mobility.

Limb placed between sand-bags and Buck's extension applied. Sand-bag also over thigh to control spasm of muscles.

Patient has used catheter twice daily for four years on account of prostatic obstruction.

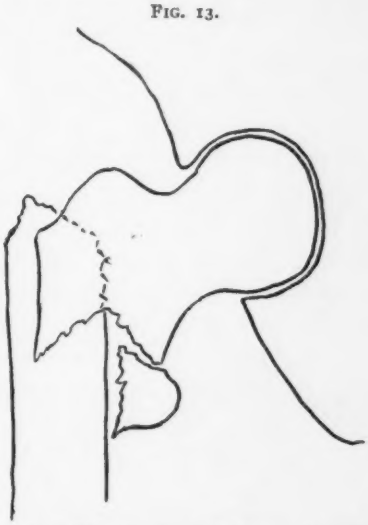
December 12. Patient was removed to his home. Subsequent history not known.

CASE IX.—*Fracture of the Lesser Trochanter and Fracture Through the Trochanters* (Fig. 13).—Mary D. was forty-six years old. She was crossing the street with the week's wash in her arms, when her foot struck a brick in the pavement. She fell, striking her right hip against the curb-stone. She had just had "two glasses" of beer, but nevertheless she fainted. On admission to the Episcopal Hospital, Dr. Frazier's service, January 9, 1913, the beer had begun to do its work, as she was slightly intoxicated. The right lower extremity was everted, and inversion

FIG. 12.

Case VIII.—Fracture of femur through trochanters, with separation of lesser trochanter (December 3, 1912).

FIG. 13.



Case IX.—Fracture of femur through trochanters, with separation of lesser trochanter (January 10, 1913).

or any other motion caused pain. There was fulness in the upper third of the thigh, with ecchymosis laterally just below the loin. There was 2 cm. shortening, and the great trochanter was higher than that on the left. (According to the X-ray the fracture is below the great trochanter, so the upper end of the shaft must have been mistaken for the great trochanter.)

Buck's extension and sand-bags were applied, with the thigh in abduction.

From January 10 to 15 the patient was on the verge of delirium tremens.

January 16. Mental state much improved.

February 24. Shortening only 1 cm.

March 12. Walking well with crutches.

June, 1913. Walks with only moderate limp and very little disability. Has been home 3 months.

CASE X.—*Fracture of the Lesser Trochanter with Fracture Through the Trochanters* (Fig. 14).—John S., fifty-nine years old, fell from a ladder, a distance of about 9 feet, striking on his right hip. He was unable to rise without help, and has been unable to move his right leg since the accident. He was brought by patrol wagon at once to the Episcopal Hospital, and was admitted, January 18, 1913, to Dr. Frazier's service. The right lower extremity was in outward rotation, and the patient was unable to rotate it inward. There was 2.5 cm. shortening. Swelling and tenderness around the hip were marked, and there were crepitus and deformity of the upper end of the femur.

Buck's extension was applied.

January 19. The limb was placed in flexed position on an inclined plane. Skiagraph in this position showed more deformity.

January 22. Patient was etherized, and Dr. Ashhurst applied a plaster-of-Paris casing, with the limb in full abduction. Skiagraph through case showed some improvement in position.

March 5. Plaster case removed, after being on for six weeks. Good union. Shortening 3 cm. (Fig. 15). Flexion to 110°, abduction to 20°, good rotation.

CASE XI.—*Fracture of Lesser Trochanter, with Comminuted Fracture Below Trochanters, and Splitting Fracture Through Greater Trochanter* (Fig. 16). John S., thirty-four years old was a bridge-worker. On the morning of August 13, 1912, at 8 o'clock, while at work on a bridge, he lost his balance and fell 30 feet to the ground. As he landed he struck his right thigh upon a beam. He had very severe pain and was unable to rise. He was carried into a neighboring house, and was brought thence by the ambulance, being admitted to the Episcopal Hospital, in Dr. Frazier's service, at 8.30 A.M. There was no shock. Above the middle of the right femur there was deformity, crepitus and preternatural mobility. Fracture of femur, seemingly oblique, with some overlapping of fragments. The limb was in outward rotation. The shortening was 4 cm.

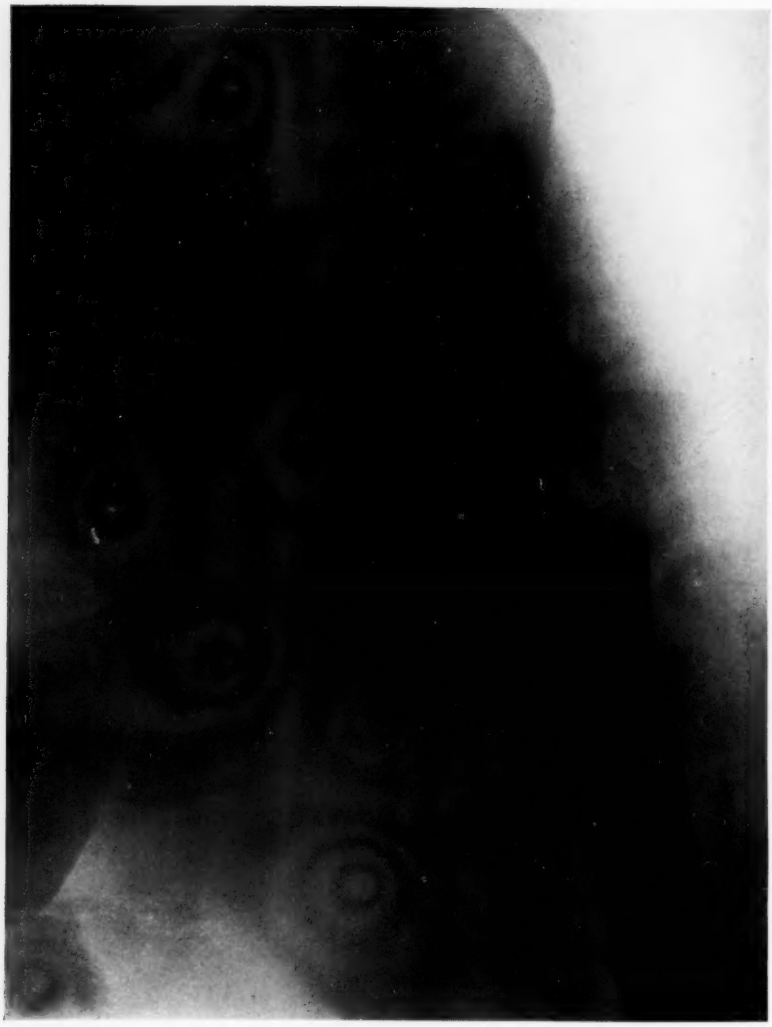
Buck's extension was applied, with Volkmann's sliding footpiece to prevent rotation of the limb; 15 pounds weight.

August 14. Entire thigh is extremely swollen; skin is tense and marked tenderness is present. Ice locally.

FIG. 14.

Case X.—Fracture of lesser trochanter with fracture through the trochanters (January 18, 1913).

FIG. 15.

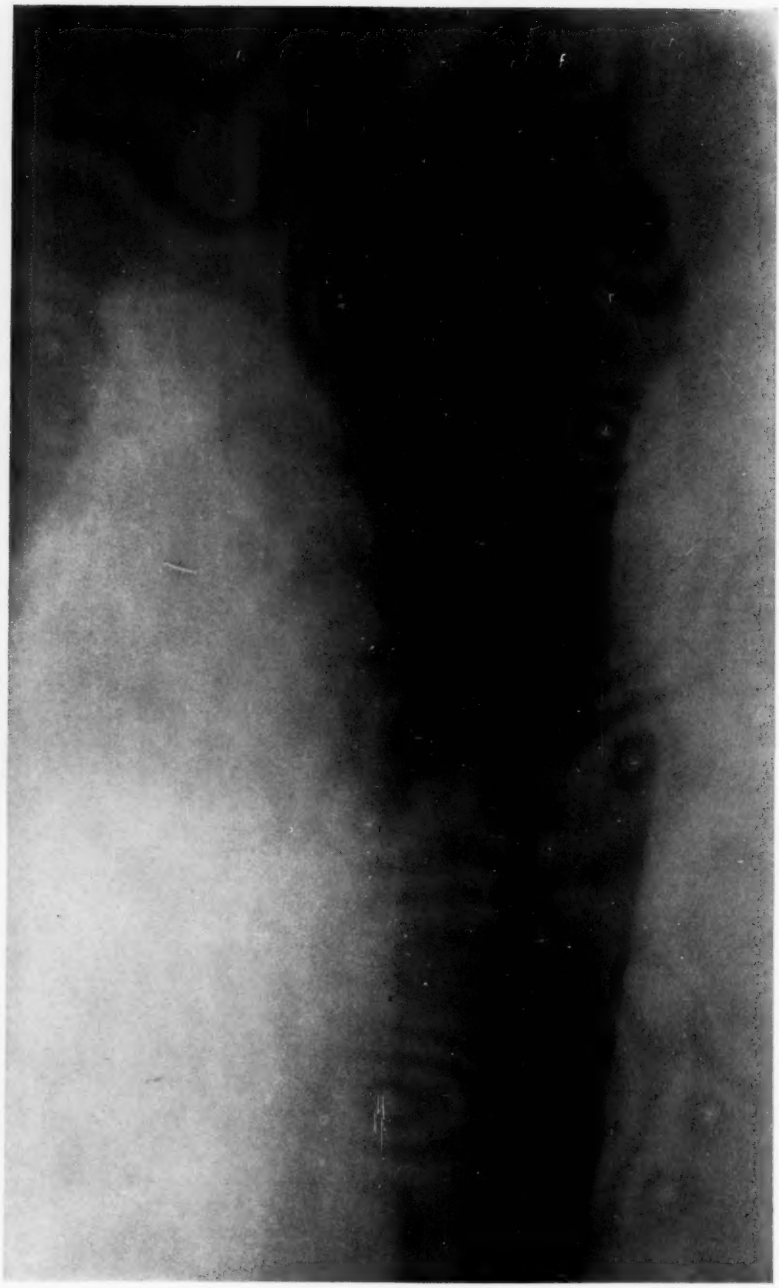


Case X.—Two months after injury. Position obtained by forcible abduction under ether (March 12, 1913).

FIG. 16.

Case XI.—Fracture of lesser trochanter, with comminuted fracture below trochanters and splitting fracture through greater trochanter (August 13, 1912).

FIG. 17.



Case XII.—Two months after operation (October 12, 1912).

August 15. Six pounds added to extension (21 pounds in all). Ecchymoses over thigh. Abrasion noted over site of fracture, on outer side of thigh.

August 19. Shortening 2 cm. only.

August 21. Extensive ecchymosis; swelling much less; skin can be wrinkled.

August 26. Operation by Dr. Ashhurst. Lane's plate applied to seat of fracture, three screws in each fragment. The lowest screw twisted off after half had been screwed into bone. Limb dressed in plaster of Paris from toes to groin, with Buck's extension inside of case, from knee down. About 20 pounds of weight extension.

September 20. Plaster case removed. Incision healed. Active and passive motion begun. Good union. No shortening or deformity.

October 1. In chair.

October 20. Walking with crutches.

October 28. Can walk without crutches. No shortening. Discharged (Fig. 17).

March, 1913. Patient writes that he is working, and except for some stiffness of knee has perfect use of his limb.

June, 1913. Examination shows no shortening, and no deformity. Motion of hip-joint perfect, except slight limitation of internal rotation when thigh is flexed. Knee cannot be flexed beyond 110 degrees, motion apparently being checked by adhesions of muscles to the femur.

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SIMULTANEOUS FRACTURE OF BOTH PATELLÆ,*

WITH REPORT OF TWO CASES AND A REVIEW OF THE LITERATURE.

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SIMULTANEOUS fracture of both patellæ is not a common occurrence, and consequently each man's personal experience with such is limited. Corner,[1] in a report of 504 cases of fractured patellæ, found only 1 per cent. bilateral, but does not state how many of these were simultaneous. Georg Müller[2] in reviewing 1000 fractures had 13 fractures of the patellæ, none of which were simultaneous. Heineck[3] collected 1100 cases of fractured patellæ, all treated by the open operative method over a period of ten years, with only 10 simultaneous cases. Chaput[4] in reporting a case of simultaneous fracture of both patellæ says, "The interest here is in the rarity of simultaneous fracture of the patellæ."

In a letter from Dr. William J. Mayo he says, "So far as I know, we have never had a case of simultaneous fracture of both patellæ."

Considering the rarity of this condition, I thought it would be of interest to collect the cases recorded in the literature. In every case the original report has been consulted, unless otherwise stated, so that the cases are authentic and the data correct.

The mode of fracture may be from direct violence, or indirect as by muscular contraction, or a combination of the two.

The type of fracture in simultaneous cases may be, as in fractures of a single patella, transverse, longitudinal, oblique, stellate, comminuted, compound, or any of these in combination, depending upon the manner and severity of the injury causing the same.

The injury occurs more frequently in men than in women.

* Read before the Philadelphia Academy of Surgery, April 7, 1913.

According to Piersol,[5] "The bone is not fully formed until after puberty, perhaps, not before eighteen." Consequently such an injury is not likely to occur in the young. Nor would it be expected in the aged, for the reason that the fracture of one knee-cap is uncommon in elderly people.

The following cases were operated on by Dr. Charles H. Frazier, and I am indebted to him for allowing me to report the cases at this time.

CASE I.—H. G., male, age thirty-six. Family and personal history negative. On November 18, 1912, in mounting his horse, the patient's foot slipped from the stirrup, and in attempting to regain the stirrup, both knees were thrown together and pushed violently against the horse. The horse kicked back in some peculiar manner, and, according to the patient's story, struck both knees with the one blow. He was unable to rise and fell to the ground with absolute loss of function of both legs. He was brought to the Episcopal Hospital the next day. Examination revealed a well developed and well nourished white male, with nothing in his general condition worthy of note, except perhaps, for patches of psoriasis about the elbows on the extensor surfaces, scattered areas on the back, legs, and over the forehead.

In examining the lower extremities the legs were found to be extended on the thighs as he lay in the dorsal position, and both patellæ showed transverse fractures with marked separation of the fragments. The fracture of the patellæ passed through about the junction of the upper with the lower third. Extreme tenderness was noted at the point of fracture and there was marked swelling about both knees. There was complete loss of function of the knee-joints. No marks of contusion from a kick were to be found, therefore the fractures were thought to be caused by muscular contraction.

Operation (November 22, 1912).—The fields of operation were shaved, scrubbed with green soap, sterile water and alcohol, and a dry fluff dressing applied the night before operation. The same process, omitting the shaving, was repeated the morning of operation. Just before the incisions were made official tincture of iodine was applied to the parts. A curved incision

was made from the internal condyle of the femur upward to just above the upper border of the patella, and down to the external condyle of the right femur. The flap was dissected back to expose the fragments, and the joint opened; the blood clot, of which there was a moderate amount, was removed. The edges of the torn aponeurosis were found between the fragments. The end of the fragments were cleaned. A hole was drilled from the anterosuperior surface of the upper fragment, and from the anteroinferior surface of the lower fragment, the drill emerging at corresponding points on the posterior of each fractured surface. A No. 18 silver wire was run through the drilled holes, the synovial membrane and aponeurosis, with the capsule were then sutured with chromic catgut and the wire twisted to bring the fragments in apposition. The skin was sutured with interrupted silkworm gut. The same procedure was followed on the left leg, posterior splints applied, and the patient put to bed with the legs elevated.

There was an evening rise of temperature to 100.4° each day, and on November 28 slight swelling and redness were noted about the right knee. The joint was aspirated, withdrawing 20 c.c. of slightly turbid fluid, and the same amount of a 2 per cent. formalin in glycerine solution injected. No bacterial growth was obtained from the fluid removed. There was considerable pain in the knee for the remainder of the day. His temperature remained practically normal after two days. All swelling and redness disappeared, so that on December 8, plaster-of-Paris casts were applied. The patient was out of bed the tenth day and walked with the aid of crutches on the 23d. The casts were removed on December 31, and the patient was discharged on January 4, 1913, just six weeks after the operation.

In a letter from him dated March 25, 1913, about four months after the operation, he writes as follows: "I used the crutches only four days after leaving the hospital and carry a cane on the street merely as a precaution. I have no difficulty in stepping upon and down from curbs, but find it rather hard to go up an incline. However, on the level, I walk very naturally, and have the power to extend my legs from the bent position. It is not necessary for me to lie down and rest as I did at first, since my strength is increasing daily. Sitting on the edge of a table I can bend my right knee 90° and the left about 75°."

CASE II.—R. C., male, white, age fifty-six. His past history is of the best and his habits are good. Family history negative as to the condition under consideration.

The patient, in descending the cellar steps in the dark, a lighted candle in one hand and a coal bucket in the other, slipped on the last step, threw himself backward to regain his equilibrium, felt something give way in each knee, at the same time experiencing acute pain in the same location, and both legs doubled up under him as he fell to the cellar floor. Transverse fracture of each patella was found. He was taken to the Germantown Hospital where he was operated upon five days later by the suture method, as follows:

Through a curved incision, the concavity upward, the fracture of the left patella was uncovered. The upper fragment was larger and represented three-quarters or more of the bone. The fringes of the capsule were inverted, and there were lateral tears for a distance of an inch or a little more on either side. The blood clot, which partially filled the joint, was removed and the surfaces of the broken bone laid bare and the wound in the synovial membrane and capsule closed with two layers of chromic catgut. The incision in the skin was closed with superficial silkworm gut sutures. On the right side, the conditions were practically the same as those on the left with the exception of the fact that the lower fragment was a little larger, possibly one-third of the entire bone. There were, however, the tears of the capsule on either side of the patella. The closure of the wound and the approximation of the bones was affected in the same manner as on the opposite side. Both wounds healed by first intention.

The splints were removed at the end of the first week, and the legs allowed to lie over a pillow in position of semi-flexion. Massage was begun on the tenth day, and passive motion on the seventeenth day, and the patient was allowed to walk at the end of the fourth week. Upon his discharge from the hospital, six weeks after operation, he was able to get around with crutches and could flex both legs almost to a right angle.

At present, about four months since the operation, he goes about the house without crutches, although a crutch is taken as a precaution when going to business. The legs now bend to 90 degrees and he has good extension power.

The following is a summary of the cases of simultaneous fracture of both patellæ found in the literature:

Back in 1817 Desault[6] writes of a case as follows: "A man in the Hotel Dieu fractured the rotula of each knee, in the operating room, by means of convulsive motions, produced by the operation of lithotomy." There are no other facts mentioned.

Sir Astley Cooper[7] writes of a case as follows: "A young woman was brought into my house in her father's arms and he said, 'I am obliged to carry her for she has lost the use of her legs, having broken her knee-pans eight months ago, and she has never been able to use her limbs since.' Passive motion was directed, and she was ordered to try and extend her legs after they had been bent by the surgeon. At first she could effect but little; however, by repeated trials she gradually recovered the use of her limbs."

In one of the Guy's Hospital Reports[8] the following case is recorded: A man suddenly thrown forward, in trying to save himself from a fall, heard his knees crack, and he fell to the ground. Four days later he was taken to the hospital, where the patellæ were strapped. Straight splints were applied and the legs elevated. Three days later the left patellar fragments were in apposition, while the right showed one inch separation.

Sir Astley Cooper saw him and the treatment pleased him. On the twelfth day the patient is reported as "going on perfectly well." No other notes were obtainable concerning this case.

Tufnell[9] tells of a woman, thirty-nine years old, who slipped in running down stairs, made a violent effort to catch herself, but fell forward striking her left knee on one of the steps. Examination showed the left patella to be fractured in a stellate manner and the right transversely, being torn across by muscular violence. She was treated by means of bandages and posterior splints. Passive motion was started after seven weeks and on the fifteenth week the patient left the hospital without the slightest tendency to lameness. Union was apparently osseous in the stellate fracture, while that of the transverse was by a ligamentous band.

R. Johnston[10] relates the case of a woman, thirty-three years old, who tripped, heard a crack and felt something give way. She fell and was unable to get up. Both knees were found to be swollen. Three days later the right was put up after the method devised by Dr. Sanborn,[11] and the left after Sir Astley Cooper's[12] method. Eighteen days later there was bony union in the right patella, but the left had a separation of one-quarter inch and ligamentous tissue between the fragments. Patient was discharged in about six weeks. No further notes were obtainable.

Godfrey[13] records the case of a man, who, in mistaking the lower step in coming down stairs, fractured both patellæ transversely. After many months he obtained free use of the knees and recovered without a limp.

Wendover[14] tells of a man slipping and bringing unusual strain on the left leg, with the resulting fracture of the patella. In bringing the right leg into play to save himself the right patella was broken. Both

the fractures were transverse. No further mention is made as to the patient's recovery.

H. O. Marcy[15] writes of a woman, thirty-eight years old, who, in a misstep, while crossing from the curbstone to the street, made a violent muscular exertion in trying to save herself from a fall, felt something give way in both knees and she fell to the pavement. Both patellæ were found to be fractured transversely near their middle, the upper fragment lying two inches above the lower. Ligamentous union of about ¼ to ½ inch followed.

In a letter to Dr. Wight[16] from Dr. Marcy, the latter says concerning the above case: "She could walk fairly well on the level, taking pains to keep the lower limbs nearly straight. Bending the knees gave the fear and indeed, I believe, the sensation of falling. She had great difficulty in going up and down stairs." Dr. Wight also mentions another case reported by Dr. Marcy, of single fracture with short ligamentous union, who, some years later by muscular action, broke this ligament and also the other patella at the same instant. Dr. Marcy says: "She made a very imperfect recovery, with long ligamentous union. Oddly enough the refractured patella gave the best result in marked contrast to the other patella. She cannot cross from the road to the sidewalk without help, and walks by keeping the lower limbs stiff and swinging them, much as in a case of ankylosed knee." In a letter to the writer, March 18 of this year, concerning the above two cases, Dr. Marcy says: "I sincerely regret that I cannot furnish further details."

Wight, in the same article as quoted above, reports a man, forty-four years of age, with simultaneous transverse fracture of both patellæ from a fall upon the pavement 3½ years previous to his seeing him. At the time Dr. Wight saw him he was using crutches and wearing splints, allowing partial flexion of the knees. There was fibrous union in both, with one inch separation of the right patellar fragments, and three-quarters of an inch of the left. He could not bend the knees in sitting down nor in going up and down stairs because of the lack of flexion in the knee-joints. He could not walk without the splints.

Wight[17] in a later article reports two cases of simultaneous fracture of both patellæ treated by wiring. One was a man of forty-one years, who received the impact of two hand trucks, one on each knee, and in making strong muscular action at the same time, fractured both knee-pans transversely. He operated one month later, wiring both. Seven months after operation the patient had good functional result.

The second was a forty-year-old man who fell and struck both knees on the pavement. The right patella had been wired six years before for fracture, with good result. Four weeks after the accident he wired the left patella and rewired the right, the wire of the previous operation having broken. Six months later the patient showed full recovery. Wight advises waiting at least fourteen days after injury before operating.

F. H. Hamilton,[18] in a review of 127 cases of fractured patellæ, has only one case of simultaneous fracture of both. This was in a young man twenty-two years of age, who fell on the sidewalk, causing trans-

verse fracture of both patellæ. Treated by means of inclined plane, adhesive, and rollers saturated with flour paste. Dressings were removed on the thirty-seventh day and not re-applied. Both patellæ were united by ligaments of about ½ inch.

Beauvias[19] writes of a man, thirty years old, who in playing leap-frog, was about to spring forward after striking the ground with his feet, when he heard a crackling sound and felt as though he had received a blow on the legs. He fell to the ground and was carried to the hospital, where a transverse fracture of each patella was found. The fragments were not separated more than two centimetres.

Desquin[20] writes of a man of twenty-eight years, who made a jump to a trapeze, missed, and fell to the floor. Transverse fracture of both rotulas with separation of the fragments about three to four centimetres. He was treated by pasteboard splints and bandages. After one month the fragments were united by one centimetre of fibrous callous. The legs were dressed in extension with starch bandages. During the third month all dressings were removed and passive motion begun with massage. Final result was good.

Moullin[21] knew of a man, who in the first stride of a race, was conscious of something giving way in the knee, and in an effort to save himself from a fall, the other patella also snapped.

T. A. Smith[22] records a man, forty-five years old, who slipped on the ice and felt the right knee-cap snap. He got to the elevated, and in taking a seat, the left one snapped, causing him to fall. Twelve days later the patellæ were wired. On the thirty-second day he walked about the ward without crutches or cane, and in five days more he had ninety degrees flexion of the right and seventy degrees of the left knee. On the thirty-ninth day the fragments of the left were separated one-half inch and these were re-wired two days later, finding the first wire had broken. No final result was given. From the history of this case it would seem the left patella must have been broken at the same time as the right, but did not give completely away until he started to sit down. For this reason it is classed with this series.

Chaput[23] relates a case of simultaneous fracture of both knee-pans in a woman thirty-five years old. The fragments were wired and the prepatellar periosteum sutured with catgut. Further reference of this case is made by Lafourcade,[24] in saying that massage of the muscles was begun on the tenth day and of the joint on the seventeenth day, as well as passive motion. Two months later she could walk without crutches. There was flexion to a right angle in both knees at six months.

Warbasse[25] tells of 2 cases in which both patellæ of each were operated upon by the suture method, the bones having been fractured transversely near their middle. Good results were obtained.

Scudder[26] reports a man of forty-four years, who fell from a second story window to the sidewalk, causing comminuted fracture of both knee-caps, the right being compound. At operation all the left patella was removed, as it was broken into many small pieces. The right had three fragments sutured together with silk and other small fragments were removed. Posterior and side splints were then put on for one

week. Plaster-of-Paris casts applied for four weeks longer. Discharged after nine weeks on crutches. Sixteen months after operation there was firm union of the fragments in the right side and flexion to a right angle without pain. Left flexed to slightly beyond a right angle. Function was good in both and there was practically no disability.

Prichard[27] showed a patient in whom both patellæ had been wired for fracture, with very good result.

Colle[28] reports the case of a man who fell from a wall and fractured both patellæ. He was treated by compression, immobilization and massage, with bad result. Fragments were separated two centimetres.

Porter[29] tells of a woman who jumped from a carriage to the ground and sustained fracture of each patella by muscular contraction. Wiring was successfully done.

Peyton[30] saw a case with Bullitt where both knee-caps were transversely fractured while a woman was standing on the icy pavement. Both snapped without any warning, probably due to the action of the quadriceps femoris in an effort to keep her balance. Bullitt operated on the tenth day, suturing the torn fibrous coverings with chromicized catgut. A most satisfactory result followed.

William Maddren[31] reports a woman of twenty-eight years of age who, in going down some steps, fell forward on reaching the last step, as though from weakness of the knees, striking both knees upon the ground. She felt something crack in falling and experienced great pain and loss of function in the knees. Examination revealed swelling of both knee-joints and transverse fracture of each patella. Tight bandages and posterior "L" splints were applied. The fifth day she was taken to the hospital and the fragments drawn in apposition by suturing both the tendinous capsule and aponeurosis with chromic catgut. Plaster-of-Paris casts were applied. Casts removed in six weeks and passive motion begun. Posterior splints were worn a few weeks longer. Result was osseous union of the fragments, with restoration of function.

Mayer[32] tells of a woman of thirty-nine years falling on the left knee, was assisted up, and fell on the right, fracturing both patellæ. She was not operated on for six months and there was no attempt at union. The fragments of the right were separated five centimetres and the left seven centimetres. In operating, the surfaces were freshened, the patellæ looped, and in addition, the fragments were sutured by one wire. A very satisfactory result followed, with flexion of ninety degrees.

McArthur[33] writes of a patient fracturing one patella, treated by splint and massage, with a ligamentous union resulting. Some years later the patient fractured both patellæ simultaneously, but the manner of the fracture is not stated. The lower fragment in the knee which had been broken previously was attached to the lower tendon and was removed; the elongated ligament of union, being attached to the patella, was sutured to the patellar tendon insertion. This gave a good fibrous union and a useful joint. The other patella was wired with silver, resulting in bony union, and the man can walk without even a cane.

Hamilton[34] relates the case of a boy, fifteen years old, falling from a scaffold onto both knees, fracturing the right patella in three pieces and

TABULATED SUMMARY.

No.	Sex.	Age.	Manner of fracture.	Type of fracture.	Mode of treatment.	Result.
1	Male...	36	Indirect	Transverse	Wiring and casts	Good result 4 months after. Flexion: Right knee 90°; left about 70°. Walked naturally on the level.
2	Male...	56	Indirect	Transverse	Suturing	Good result 4 months after. Flexion to right angle. Walks O. K.
3[6]	Male...	..	Indirect			
4[7]	Female..	..	.....	.....	Old fracture. Passive motion and exercise	Full recovery of limbs.
5[8]	Male...	..	Indirect	.....	Splints and strapping	Third day: left in position; right, 1 inch separation of fragments. No other notes.
6[9]	Female..	39	Right indirect. Left direct	Right transverse. Left stellate	Bandages and splints. Passive motion in 7 weeks	Good result. No tendency to lameness.
7[10]	Female..	33	Indirect	.....	Straps and splints	Eighteen days, bony union in right. Separation of ¼ inch in left and ligamentous tissue between fragments.
8[13]	Male...	..	Probably indirect	Transverse	.....	Good result. After many months recovered without a limp.
9[14]	Male...	..	Indirect	Transverse		
10[15]	Female..	38	Indirect	Transverse	.....	Ligamentous union ¼–½ inch. Difficulty in walking up and down stairs. On the level, O. K.
11[16]	Female..	..	Indirect	.....	.....	Imperfect recovery.
12[16]	Male...	44	Direct	Transverse	.....	Fibrous union in both. One inch separation in right; ¾ inches in left. Greatest difficulty in flexion.
13[17]	Male...	41	Indirect and direct	Transverse	Wiring	Good functional action 7 months later.

14[17]	Male...	40	Direct	.....	Wiring	Full recovery 6 months later.
15[18]	Male...	22	Direct	Transverse	Inclined plane, adhesive and flour paste rollers	Good results. Both patellæ united by ligaments of about ½ inch.
16[19]	Male...	30	Indirect	Transverse		
17[20]	Male...	28	Direct	Transverse	Splints, starch bandages, passive motion and massage	Fragments united in one month by 1 cm. of fibrous callous. Good result.
18[21]	Male...	..	Indirect			
19[22]	Male...	45	Indirect	.....	Wiring. Left rewired 41st day as first wire broke	Thirty-seven days, 90° flexion of right, 70° of left. Left rewired, no final results.
20[23, 24]	Female..	35	.....	.....	Fragments wired. Prepatellar periosteum sutured with catgut. Massage and passive motion	Two months walking with crutches. In 6 months flexion to a right angle in both knees.
21[25]	....	..	.....	Transverse	Suturing	Good result.
22[25]	....	..	.....	Transverse	Suturing	Good result.
23[26]	Male...	44	Direct	Comminuted. Right, compound	Left patella removed. Right, 3 fragments sutured with silk, small fragments removed. Posterior and side splints 1 week. Plaster of Paris 4 weeks longer	In 16 months firm union of fragments in right, and flexion to right angle without pain. Left, beyond right angle. Function good.
24[27]	....	..	.....	.....	Wiring	Very good result.
25[28]	Male...	..	.....	.....	Compression, immobilization and massage	Bad result.
26[29]	Female..	..	Indirect	.....	Wiring	Successful.
27[30]	Female..	..	Indirect	Transverse	Suturing	Most satisfactory.
28[31]	Female..	28	Indirect	Transverse	Sutured with catgut. Plaster-of-Paris casts 6 weeks. Passive motion	Osseous union of fragments and restoration of function.
29[32]	Female..	39	Direct	.....	Wiring and patellæ looped	Good results, with flexion to 90°.
30[33]	Male...	..	.....	One transverse	One wired, other sutured to patellar tendon insertion	Fibrous union with satisfactory results.
31[34]	Male...	15	Direct	One comminuted	Wiring	Good bony union with good function.
32[35]	Female..	34	Direct	Rt. transverse. Lt. comminuted	Sutured with iodized catgut. Plaster-of-Paris casts	Perfect bony union.

TABULATED SUMMARY.—*Continued.*

No.	Sex.	Age.	Manner of fracture.	Type of fracture.	Mode of treatment.	Result.
33[36]	Female..	30	Indirect	Transverse	Wiring	Firm union resulted.
34[37]	Male...	31	Probably direct	Transverse	Sutured with chromic catgut	Good result. Legs as good as ever. Bend to right angle.
35[38]	Male...	30	Direct	Transverse	Posterior splints and casts. Wired later	Good result after wiring.
36[33]	Male...	..	.....	.....	One sutured. Other non-operative	Good results.
37[38]	Female..	..	.....	.....	One sutured. Other non-operative	Good results.
38[38]	Female..	..	.....	.....	One sutured. Other non-operative	Good results.
39[39]	Male...	41	.....	.....	Wiring	Good results after four years.
40[41]	Male...	65	Indirect	.....	Right wired. Left looped with silk (braided)	Fine results.
41	Female..	35	Indirect	Transverse	Patellæ looped	Good results. Primary union with perfect knee-joints.
42[42]						
43[42]						
44[40]	Female..	37	Probably indirect	.....	Wiring	Good result 15 months later.

the left so that a piece turned into the joint, necessitating removal of the piece. Nine days after the accident wiring of the patella was done, and in five months there was good bony union, with good function, allowing him to follow his usual employment.

D. Eve[35] had a woman of thirty-four years, who fell in an elevator, from the third story to the basement, sustaining a fracture of each patella. The right was transverse just below its middle, while the left had one transverse line, as well as an oblique, running into the transverse. Elevation, posterior splints and bandaging comprised the treatment for five days. Then through a longitudinal median incision the torn membranes were sutured close to the bone with iodized catgut, drawing the apposing edges together. The upper part of the patellar tendons were sutured to the lower portion of the quadriceps tendon. Posterior splints were then applied and the legs elevated. After one week plaster casts were applied and allowed to remain for six weeks. Perfect union resulted in both patellæ. Patient soon expected to be on crutches.

Robinson[36] tells of a woman of thirty years, slipping on the stairs, falling forward and was sure she hadn't struck the knees. There was no sign of bruises on the knees, but both patellæ were fractured transversely, the right at the junction of the upper and middle thirds, and the left across its middle. There was fluid and blood in both knees. On the sixth day both were wired, with firm union resulting.

Rutherford Morison[37] reports a young man of thirty-one years, who fell on his face in going rapidly down stairs, with the result of fracturing both knee-caps transversely. There was at least one inch separation. Ten days later he operated, suturing the fragments and aponeurosis with chromic catgut. Gooch splints applied for six weeks. In fifteen weeks the knees would bend to a right angle and he could ride a bicycle perfectly well. Never any pain or stiffness in the knees and he says his legs are as good as ever.

William Sheen[38] writes of a thirty-year-old young man falling down stairs and striking both knees, fracturing each patella transversely. Treated with posterior splints and adhesive plaster for twenty-six days and then plaster casts. When seen by Mr. Sheen he could walk feebly with sticks, so that operation was decided upon, and both knee-caps were wired. About nine weeks later he could walk without crutches and the knees could be bent nearly to a right angle. The final result was good and he had power of going up and down stairs very well.

Lucas-Championnière told Sheen he had three cases of simultaneous fracture of the patellæ. Two were in women and one in a man. In each case one patella was sutured and the other not. As far as he knew all three had, eventually, useful legs. He did not recall the mode of production and they were old cases when he got them.

F. Eve[39] reports the case of a male, forty-one years old, who had broken both patellæ nine months before he saw him. He had been treated by strapping for six weeks, but a subsequent fall left him powerless to walk. There was a separation of three inches on each side. In operating, the insertion of the quadriceps into each upper fragment was

divided, the fibrous tissue between the fragments dissected away, and the bony surfaces freshened. The fragments were then wired. Four years later the gaps in the quadriceps tendons were partially filled in and the power of extension was good.

Barcus[40] relates the case of a woman of thirty-seven years, who fractured the right patella and had it wired. About six months later she slipped, fractured the left patella and re-fractured the right. Both were wired and a good result was reported fifteen months later.

Nassau,[41] at a meeting of this Society, January 8, 1912, reported a case in a man sixty-five years of age, who slipped and fractured both knee-pans. Under local anæsthesia the right was wired and the left treated by running braided silk around its fragments. A fine result followed.

Robert T. Morris, in a letter to the writer, tells of a case he had two years ago. He was called by Thomas Byrne to see a woman of about thirty-five years, who in stooping suddenly to pick something from the gutter, fractured both knee-pans transversely, one through the middle and the other through the lower third. After six days he operated through a transverse incision, freeing the inturned fibroid capsule and suturing the patellæ after the Blake method, *i.e.*, "encircling the entire patella with a strand of kangaroo tendon, which brings the fragments into position, when it is tied." There was primary union, with practically perfect knee-joints to date.

Malgaigne[42] states that Camper and Süe each saw a case of simultaneous fracture of both patellæ, but gives no further information.

In summarizing the above cases, I find there are 44. Age was mentioned in 25, ranging from 15 to 65, with an average of 36.6 years. Sex was stated in 39 cases, 23 (59 per cent.) being males and 16 (41 per cent.) females. The manner of fracture is mentioned in 28 cases or 56 patellæ. Thirty-five (62.6 per cent.) of these were fractured in an indirect manner, 19 (33.9 per cent.) by direct violence, and 2 (3.5 per cent.) by a combination of the direct and indirect. The type of fracture is recorded concerning 44 patellæ. Thirty-nine (88.6 + per cent.) were transverse, 3 (6.8 + per cent.) comminuted, 1 (2.2 + per cent.) compound comminuted and 1 (2.2 + per cent.) stellate. Of the transverse type, 19 (48.7 per cent.) were by the indirect manner, 9 (23.1 + per cent.) by direct violence, 2 (5.1 + per cent.) by combination of the two above, and in 9 (23.1 per cent.) cases no statement is made as to the type of fracture.

Of the 68 patellæ (34 cases) concerning which the mode of treatment was mentioned, 17 (25 per cent.) were not

operated, 28 (41.2 per cent.) wired, 19 (28 per cent.) sutured, 3 (4.4 per cent.) looped, and 1 (1.4 per cent.) removed. In all, 51 patellæ were treated by an open operative method and each obtained a good functional result. Of the non-operative cases, several resulted rather badly. Case No. 35 in the tabulated summary, originally treated by non-operative methods with a bad result, later had the patellæ wired, thus regaining the function of the limbs.

Wight [16] back in 1884 wrote, "In fact, a patient having had both patellæ fractured at the same time may reasonably expect to become a most deplorable and pitiable cripple." In a letter received from him a few days ago, he shows a marked change in his attitude concerning the above by saying, "The statement you refer to no longer holds good. The modern method of suturing gives a restoration of function, providing the rent in the capsule on either side of the patella is carefully closed to its extreme limits." It is more than evident from the above, that the added risk in the operative treatment in the hands of a skilled operator is far and away outclassed by the good functional result obtained. Operation should not, however, be advised where there is a slight separation of the fragments, in incomplete fractures, nor is the subaponeurotic and longitudinal types, for these almost invariably give good union of the fragments. If there is a contra-indication to general anæsthesia from advanced consumption, diabetes, hepatic or cardiorenal disease, the operation may be done under local or low spinal anæsthesia.

The time of operation varies greatly with different men, ranging from a day to three weeks, the variance being due to the question whether or not it is better to operate before, during or after swelling in the knee-joint.

As to the operation of choice, there is not a great difference so far as the functional outcome is concerned. In the cases herein reported the wiring, suturing and looping methods seem to give equally good functional results. The wiring method, according to Dennis,[43] first done by John Rhea Barton, of Philadelphia, in 1834, and later revived by Mr. Lister, has many advocates.

Andrews[44] speaks of wiring as follows: "The old-fashioned term, 'wiring the patella,' is a misnomer and obsolete, so far as my own practice goes. The patella union is only an incident in the ligamentous and tendinous repair by suture."

In another article[45] he advocates imbricating the free disfringes of periosteum and fibrous tissue.

Finally, we observe that simultaneous fracture of both patellæ is a rare condition, occurring in less than 1 per cent. of all cases of fractured patellæ, and that a poor functional result may be expected unless the patient is given the advantage of an open operation where there is enough separation of the fragments, providing asepsis is carried out and the operator is one of ability.

NOTE.—Since preparing this paper a letter has been received from Dr. W. L. Munro, of Providence, R. I., relating the following case of his:

J. L., age thirty-five. On July 5, 1909, a person standing behind the patient struck both knees with his own knees, causing sudden flexion. He tried to recover himself when he "felt something snap" and fell to the ground with fracture of both patellæ.

Operation.—Longitudinal incisions 3 inches, fringe removed, joint irrigated with saline. Edges of the capsule and periosteum, together with lateral reflexion of extensor tendons united with No. I chromic, reinforced by mattress suture No. 3 chromic from the ligament to tendon.

July 20: Plasters cut down and stitches removed. Skin healed perfectly. Excellent result in both patellæ. Line of fracture cannot be felt. Passive motion begun. Considerable stiffness of joints.

July 25: Patient allowed upon crutches. Passive motion continued. Joints limbering up.

July 30: Freedom of motion increasing. Walks with crutches without difficulty.

Aug 2: Discharged.

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UNCOMPLICATED FRACTURES OF THE TARSAL SCAPHOID.*

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IT is only very recently that fractures of the carpal scaphoid have been prominently brought to our notice, but that of the tarsal is still unnoticed. This paper is therefore merely a plea for the recognition of a fracture which is really of importance and which should be more studied. The vague term "sprain" of the ankle should really have no place in our vocabulary. Any condition deviating from the normal has a definite underlying pathological basis. The old expression "sprain of the back" has happily been discarded, thanks to Goldthwait. The terms "lumbago," "sciatica," and a few others have likewise met their fate. It is now time that the term "sprain of the ankle" should also go, and that in every injury to the foot or ankle a definite diagnosis should be made. Very frequently a weak foot in later life can the more readily be understood and the more rationally treated if its etiology has been properly determined. An injury such as is to be described in this paper is very frequently followed by a weak or flat foot. The ordinary treatment for flat foot, if carried out in this line of cases, is positively injurious. This will be shown later.

Very little attention has thus far been paid by writers to simple uncomplicated fractures of the tarsal scaphoid. Most of the important text-books on fractures ignore it entirely, while one or two merely mention that it is occasionally seen. Where the subject is mentioned the statement is made that it is a very rare condition, rarely seen except in combination with fractures of other bones of the foot, and due to a severe crushing injury.

* Read before the Medical Society of the City Hospital Alumni.

Uncomplicated fractures of this bone are not as rare as are commonly supposed. They frequently pass as sprains of a severe type. There is usually no total disability following a fracture of the scaphoid, and for this reason a fracture is not suspected. The bone is normally prominent, and the increased prominence is taken as a bruise or synovitis. Crepitus is not one of its common symptoms, motion of the mid-tarsal joints is not greatly limited, and the tenderness is not intense. The greatest discomfort is felt in walking, as in that act the scaphoid, being the highest point of the long arch of the foot, does not give the proper support to the body. A traumatic flat foot, with its train of symptoms, results.

No great violence is required to produce this fracture. A misstep, a turn of the foot, or a moderate blow is sufficient. The break is always found at the tubercle. The tubercle of the scaphoid has a separate centre of ossification and can practically be considered as an epiphysis. This will explain why this injury is more often noted in adolescence, when the epiphyseal line is very active and vascular. Other epiphyseal fractures at this period are comparatively common, and this can be classed among them. Placed as the scaphoid is, at the highest point of the arch, with no support beneath it, it would naturally take less violence to injure it than any other of the tarsal bones. Again, the powerful tibialis posticus is attached to the tubercle, and any undue tension on this muscle would tear this portion of the bone from the scaphoid. These factors will readily explain why the tubercle is the seat of fracture.

Symptoms.—When seen in an adolescent, the symptoms vary to a degree from those seen in the adult. Frequently the original injury has been forgotten, and is not considered to have played a part in the production of the resulting painful weak foot. It is for a "weak ankle" that relief is sought. Upon examination a weak or a flat foot is the condition at first glance noted. It differs, however, from an ordinary weak foot. The abduction is more pronounced and of a painful character. The scaphoid is displaced downward, is thickened and tender. In a flat foot of whatever degree tenderness of

the scaphoid is not elicited and is not part of the symptom-complex. The pain across the instep found in flat foot is here also present. Its etiology, the depression of the arch and consequent stretching of the mid-tarsal ligaments, being the same. No tenderness, however, is seen over the tubercle of the calcis, the point of attachment of the plantar fascia, a condition usually noted in an ordinary weak or flat foot. The pain frequently extends up the limb, following the tibialis posticus, whose attachment to the scaphoid has been severed. The antagonistic peronei are now permitted unhindered to contract and abduct the foot. This tonic contraction of the peronei finally leads to a chronic irritation, and a rigidity of the foot in valgus results, comparable to the non-traumatic rigid valgus. In this traumatic case the point of differentiation lies in the tenderness on the inner side of the foot, both muscular and osseous.

Motions of the foot, as a rule, are not greatly restricted in those cases where the peronei have not yet become spastic. Forced abduction is the one passive motion which is limited and painful, as this motion further separates the fragments of the scaphoid and calls for resistance on the part of the traumatized and loosened tibialis posticus.

Where a synovitis exists, and the existing trauma has been of a slight character and forgotten, difficulty in explaining the condition is met. Here it is not uncommon to ascribe it to " rheumatism," a blanket term for many diagnostic sins. Upon examination very little, if any, local heat is found, no general rise of temperature is seen—in short, no sign of inflammation is present. Chronic rheumatism is then considered. But why so limited to one joint? Here, again, the thickened scaphoid, the free mid-tarsal joint motion, the slight peroneal contraction, the moderate tenderness over the scaphoid and tibialis posticus, and the unilateral flat foot help us to arrive at our diagnosis. This lack of disability of the tarsal joints, which as a rule hides the true findings of fracture from us, is the true means of diagnosing this traumatic condition from the ordinary rigid flat foot.

This report is based upon eight cases—four in the adolescent and four in the adult. In none of these cases were the other tarsal bones involved. In the few cases thus far described this injury was always accompanied by one or more of the other tarsal bones, and the trauma always of a severe type. The conclusion had naturally been drawn that fracture of the scaphoid as an entity was rare. This can now readily be disproved.

CASE REPORTS.

CASE I.—C. F., female, age 14. Remembers no direct injury. Thinks that one month before any pain appeared in the foot she tripped and fell going up-stairs. Was not disabled. About four weeks later left foot became painful and patient began to limp. Disability increased, and two weeks later she consulted me. The entire ankle, inner and outer side, was œdematous. (This was also noted on the other foot.) Motions at astragalo-tibial joint good, mid-tarsal restricted, in abduction. Adduction good. Tenderness over scaphoid. Walks with decided limp. Both feet flabby, of the underdeveloped adolescent female type. Has been wearing metal plates, and the irritation at the scaphoid was at first assigned to pressure from it. Pain was experienced only in walking. A suggestion of ecchymosis present. Provisional diagnosis: Fracture of scaphoid, corroborated by X-ray. The probable cause of this fracture, the muscular action of the posterior tibial upon the tubercle of the scaphoid.

The metal plate worn by the patient really exaggerated the pain in the scaphoid by direct pressure. The added fact that this pain was noted only during the act of walking corroborates it. From this case and from the following ones we will note that the usual method of treating weak feet by the use of metal plates is in this class of traumatic weak feet very injurious. A yielding, semi-elastic material, such as cork, is the best object to use.

In this case the treatment consisted of padding the foot with felt and bandaging until the tenderness disappeared (about three weeks), and then applying a shoe with a cork pad built in the arch. Massage and exercise.

CASE II.—S. H., male, age 15. Stumbled while at play in the

school-yard, and caught foot in a hollow. Foot was twisted. Got up and walked, but painfully. Was seen by me the next day.

Tenderness and thickening over the scaphoid. No ecchymosis, slight œdema, no crepitus. Manipulations of foot free, except abduction. Some tenderness over posterior tibial. Long arch on this foot somewhat lower than other (right).

Diagnosis: Fracture of the scaphoid. Confirmed by radiograph.

CASE III.—S. D., male, age 13. Fell while playing. Next day foot became painful. Saw him on second day after injury. Foot pained him only in walking.

Symptoms were identical to those seen in Case II.

Diagnosis: Fracture of scaphoid. X-ray positive.

CASE IV.—R. F., female, age 15. Remembers no definite injury. Foot painful for four weeks, especially on walking. Pain more marked on turning foot and on walking over an uneven surface.

Thickening and œdema over inner side of foot, tenderness and thickening over scaphoid, no ecchymosis, arch lowered, all motions good except abduction.

Diagnosis: Fracture of scaphoid. X-ray positive.

CASE V.—E. P., female, age 25, teacher of gymnastics. Turned foot while exercising. Became somewhat swollen and painful. Continued to use foot for three weeks, but with increasing pain. Consulted me three weeks after injury. Slight swelling over ankle-joint, marked tenderness over scaphoid, with thickening over this bone; long arch somewhat depressed, abduction of foot very painful. Other motions of foot good. Ankle motions good.

Diagnosis: Fracture of scaphoid. Confirmed by radiograph.

CASE VI.—R. P., female, age 44. In boarding a car which started while patient was on lower step she was thrown forward, striking right foot against upper step. She did not consider herself disabled, and continued her journey, performed her shopping, and returned home four hours later. During this time the discomfort was gradually increasing, and on arriving home I was consulted for a "sprained ankle."

Examination revealed a tender area over the scaphoid, œdema of the tarsus, flattening and thickening of the scaphoid, and tenderness over the posterior tibial. Motions at the astragalo-

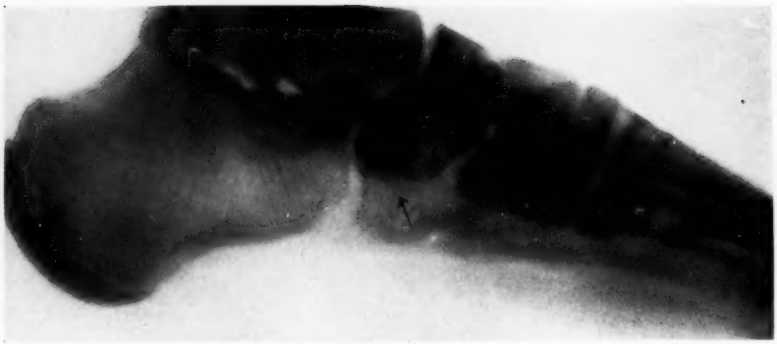
FIG. 1.

Case I. Traumatic flat-foot (left) resulting from fracture of tubercle of scaphoid (adolescent).

FIG. 2.

Case I. Fracture of tubercle of scaphoid.

FIG. 3.



Case II. Marked separation of tubercle of scaphoid.

FIG. 4

Normal.

FIG. 5.

Case VI. Separation of tubercle, in adult.

FIG. 6.

Case VII. Fracture due to muscle action, in adult.

tibial joint good. At the mid-tarsal joint abduction was painful and limited, adduction good. Slight ecchymosis over scaphoid, no crepitus.

Diagnosis: Fracture of scaphoid. Confirmed by radiograph.

CASE VII.—E. C., female, age 37. Turned foot while walking. Disability immediate, and had to be assisted home. Saw patient two hours later. Foot somewhat swollen, no ecchymosis. Tenderness over scaphoid and up toward leg (over posterior tibial). Flattening and thickening over scaphoid. Abduction of foot painful, other motions free.

Diagnosis: Fracture of scaphoid. Confirmed by radiograph.

CASE VIII.—Mrs. F. B., age 48. About six months ago sprained ankle. Felt uncomfortable for several weeks, but was not laid up. Discomfort has gradually increased, finally ending in what the patient claimed to be total disability. Upon examination the scaphoid was very tender, the arch low, abduction of the foot limited and extremely painful. Other motions of the foot were free.

Patient is of an extremely nervous type, and much of her pain may safely be discounted. The radiograph, however, showed a fracture of the tubercle of the scaphoid, with a wide separation from the rest of the scaphoid.

This patient is still under treatment and prognosis is indefinite.

RECAPITULATION.

In all of these cases the symptoms were constant, representing an entity. The injury was slight, the disability (with one exception) not immediate. Crepitus absent, ecchymosis slight; scaphoid thickened, flattened, and tender; tenderness along posterior tibial muscle; motions at astragalo-tibial joint not impaired; abduction of foot practically the only motion limited; long arch of foot depressed.

The radiograph in all cases revealed a fracture of the tubercle. No other bones were involved. In all cases a traumatic flat foot resulted.

In the four adolescent cases muscle tension was the only injury. In the adult cases two were of this same class, the other two received injuries of a more severe type. The

injuries reported by others were of a severe crushing type which resulted in fracture of several bones or comminution of scaphoids.

The treatment in those cases which were seen immediately consisted in immobilization for ten or fourteen days, followed by massage and felt padding under arch. A cork pad was later built in the shoe; in the cases not seen early strapping and felt pads till pain was relieved, then a cork pad in the shoe. A metal plate such as is commonly used is harmful in this class of lowered painful arch. This produces pressure on the painful prominent scaphoid, and keeps up the irritation. The soft felt pad is to be used until all pain is relieved.

FIG. 1.

Cyst of metacarpal bone. (Arrow points to cyst.)

CYST OF THE FIFTH METACARPAL BONE.

A COMPLICATION OF CHRONIC OSTEO-ARTHRITIS.

BY JOHN R. McDILL, M.D.,

OF MILWAUKEE, WIS.

THIS case is reported for purposes of record. Since the subject of bone cysts has received so much attention cases are coming to light rapidly, but so far none have been reported in the long bones of the hands or feet. This case is from a woman sixty-five years of age, who has suffered from chronic "indigestion" for forty years; chronic recurrent tonsillitis about as long, and for the last 25 years has had a constantly increasing cardiovascular disease which at present shows a heart enormously dilated and hypertrophied, tumultuous arrhythmia, the cardiac muscles weak and relaxed, and showing considerable degeneration. The osteo-arthropathic changes are not extreme, and are plainly seen in the skiagraph; the attacks that led to them are periodical and are concomitant with appendiceal and gastric symptoms. Wassermann reaction negative. Noguchi's luetin reaction negative. Three years ago a small painless swelling with no discoloration began over the fifth metacarpal bone, and gradually increased for one year when it rapidly swelled, became painful, and was opened, giving exit to stringy mucopus, which as rapidly subsided, and seemed about to heal when six weeks later it opened again near the old incision, evacuating more stringy pus; it was poulticed for one year, during which time it opened every three or six days to discharge a drop or fraction of a drop of a clear fluid; during the last year it discharged about every six weeks; there is no enlargement of the bone.

DIRECT SUTURE OF THE BRACHIAL ARTERY FOLLOWING RUPTURE, RESULT OF TRAUMATISM.

BY J. GARLAND SHERRILL, M.D.,

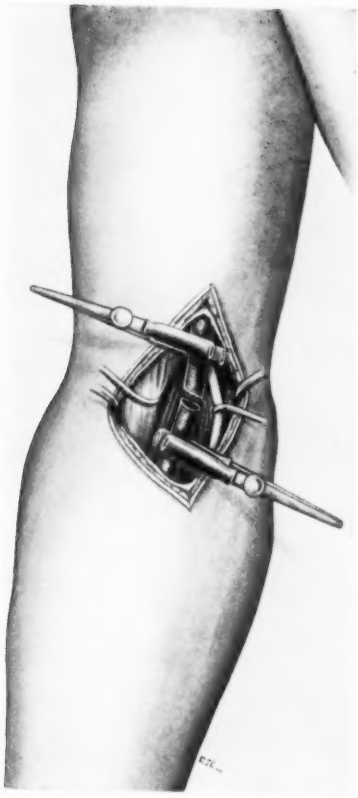
OF LOUISVILLE, KY.

In view of the recent work in the line of vascular surgery, a study of the results of operation of this nature should prove valuable, therefore the following very interesting case is reported.

On December 31, 1912, the following case came under observation: The patient, a young man, twenty-three years of age, in removing some material from a centrifugal machine had his arm caught and twisted in such a way that a backward dislocation resulted at the elbow. When first seen by the writer about an hour later, he was complaining greatly of pain; there was marked swelling in the forearm, which was purple in color, and also an entire absence of radial pulsation, but there were no symptoms of false aneurism present. Both bones of the forearm were dislocated backward at the elbow. It was at once suspected that the brachial artery had been severed; his arm was at first immersed in hot water for some time to determine whether or not the circulation could be restored. At the end of three hours, there being no improvement and a marked increase in the swelling, an incision was made down to the brachial at the bend of the elbow. The humerus, which was lying in front of the condyle of the olecranon, was restored to its position; the ends of the brachial artery stood forth prominently in the wound, both being filled with blood clot, no fresh blood being present. A small amount of clot was found among the torn muscles.

It seemed to the writer that with the blood vessel occluded a noticeable collateral circulation should have formed by this time, if such result were likely to obtain. Therefore, it was

FIG. 1.



Exposure of wounded artery preliminary to suture.

concluded that a direct suture of the torn ends of the artery offered to the patient the best possible chance of saving his arm. The clots were removed from both the distal and proximal ends of the vessel and a Crile clamp then placed upon each to control bleeding during the steps of the operation. It is likely that the clamp on the lower end was not necessary, as that vessel did not bleed when the clot was removed, but its use facilitated considerably the manipulation of the torn vessel. The sheath of the artery was torn away from the distal portion and had contracted somewhat over the proximal end. This was held out of the way while the vessel itself was sutured. In making the anastomosis, the method described by Carrel and employed by Crile was used. A very fine linen thread was separated into its three primary strands, one of which was carried through a very fine round needle (No. 16, Kirby), the thread being previously saturated with sterile vaseline. Three guy sutures were passed through the coats of the vessel; the lower suture was held by a forceps which was allowed to hang down, and the other two caught by forceps which were held by my assistant, thus giving a straight line for the suturing, which was done by continuous suture. The dragging of the forceps below prevented any possibility of catching the wall opposite the line of intended suture. The vessel was turned after each suture in such a way that each side of the triangle was completely closed. After this was accomplished the clamps were released and the blood was allowed to flow, a small amount escaping; an additional suture controlled the hemorrhage and the sheath was drawn down from the proximal side and united to that from which it had been torn below. Following this the clamps were again removed and the blood allowed to flow through the line of anastomosis which it did without any escaping from the vessel.

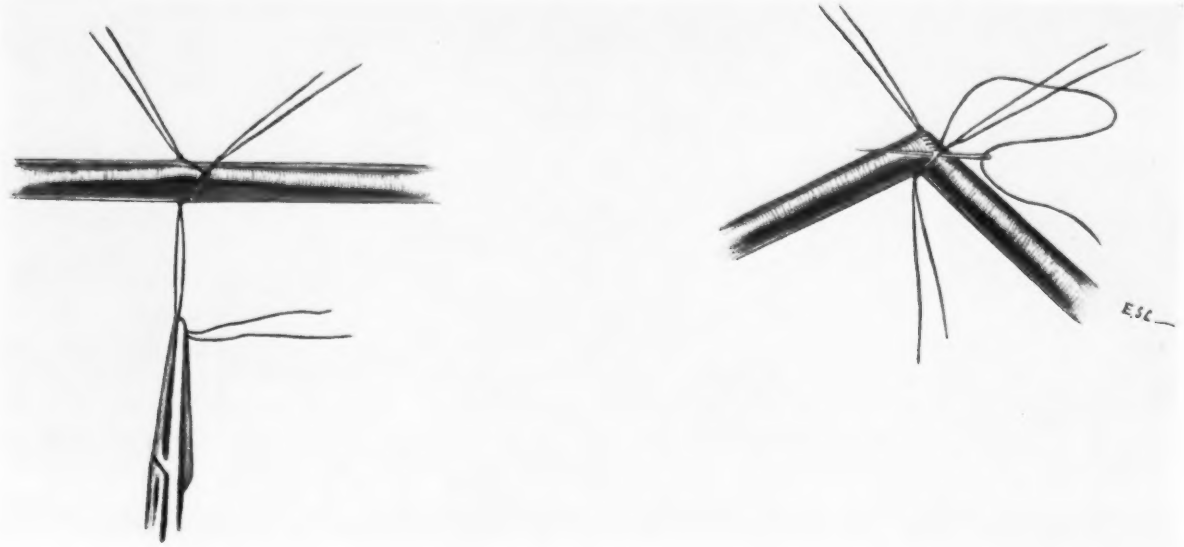
The median nerve was exposed in the wound but was apparently uninjured. The wound was closed without drainage and the arm put up in a voluminous dressing in a position of partial flexion. Within five minutes after the suturing of

the vessel was completed the circulation had returned in the hand, although we were unable to certainly determine a pulse at the radial artery. The patient made a somewhat protracted convalescence and has been disturbed some by the numbness in the fingers, which probably resulted from the stretching of the median nerve. There has also been some slight impairment of motion at the elbow. This is gradually disappearing and it is hoped that he will have complete restoration of function. At the present time the radial pulse is quite as good as in the other arm, and it is possible that the reason it was not felt immediately after the operation was in part due to the swelling and in part due to the fact that there was a slight narrowing of the lumen of the artery at the point of suture, which only permitted a portion of the blood stream to pass. Prompt restoration of circulation in the hand following the suturing and our inability to obtain the restoration of function prior to the operation leads to the conclusion that this boy would have lost his arm had not the direct suture been done. Granting, however, that the collateral circulation might have been restored without anastomosing the vessel, it certainly occurred very much more promptly following the operation than would have been at all likely otherwise.

The writer wishes to express his thanks to Drs. Carrel and Crile for their work along this line and the description of the operative technic which enabled him to perform this operation without any difficulty.

It would seem that this case was of sufficient interest to be recorded and that these gentlemen have opened a field in surgery which will allow the accomplishment of many operations which would not have been considered formerly.

FIG. 2.



Suture of artery. (After Carrel.)

SUCTION TIP FOR ASPIRATION IN ABDOMINAL OPERATIONS.

BY EUGENE H. POOL, M.D.,

OF NEW YORK,

Attending Surgeon to French Hospital; Associate Attending Surgeon to the New York Hospital.

AN apparatus for aspiration, described by J. H. Kenyon and E. H. Pool, in *Surgery, Gynæcology and Obstetrics,* December, 1909, is in daily use in the operating rooms of the New York Hospital. The details of the apparatus and its manifold uses were given in that article.

We have found the procedure especially serviceable in operations within the peritoneal cavity for the rapid removal of large accumulations of pus, blood, and other fluids; also, as a substitute for or adjunct to gauze sponging in the removal of small amounts of pus and blood, since its use entails much less trauma to the peritoneum than is produced by sponging with gauze. These applications of aspiration have been adopted by others with some hesitation, because it is not generally understood how any tube connected with powerful suction can be passed into the abdominal cavity without drawing into its lumen intestine or omentum, thus becoming plugged and causing injury to these structures. Such incredulity has led to this report.

The important feature of the apparatus in abdominal cases is the tip, which consists of an inner, suction tube, and an outer, protecting tube. The inner tube has two openings at its tip. The outer tube has numerous perforations in its distal third and several openings at its proximal or outer end so arranged that the hand of the operator cannot occlude them. These openings at the outer end allow a column of air to pass freely from outside of the wound between the outer and inner tubes to the end of the inner tube. In consequence, a vacuum cannot be formed under any conditions. Therefore, while

fluids which are not too dense and viscid pass through the lumina of the outer tube to the tip of the inner tube where they are aspirated, the intestine or omentum is not sucked into the fenestrations. In its daily use at the New York Hospital for about six years no recognizable injury has resulted.

Many varieties of tips have been made and tried. The one that has finally proved most satisfactory for routine work is a *straight tip without irrigating tube* (Fig. 1). The irrigating tube has been eliminated as unnecessary. In this respect we have reverted to our original type. In the rare event of irrigation being indicated, a separate irrigating nozzle may be inserted by the side of the suction tip.

A few words in regard to our experience as to structural details may be appropriate. As originally made, the tips presented three objectionable features. The tip of the outer tube

FIG. 1.

Straight tip without irrigating tube for aspiration in abdominal operations.

was composed of a separate piece of metal cemented to the main tube. It frequently separated when the instrument was dropped. The curved outer end of the inner tube occasionally became acutely bent or broken as a result of rough usage. Finally, the end for connection with the rubber tubing was difficult to adjust. In the present model these disadvantages are avoided. The tip of the outer tube is made of the same piece of metal as the rest of the tube. The inner tube is comparatively heavy and straight with a coarse screw-thread olivary end for connection with the rubber tubing. The straight tube has proved much stronger than the bent, and the olivary end ensures a satisfactory and easy connection with the rubber tube. The tip here described is of convenient size and its strong construction enables it to withstand constant rough usage.

While suction may be produced by various methods, we

use an "ejector" attached to the steam pipe in the engine room, whence a metal pipe leads to the operating room. A non-collapsible rubber hose (known to the trade as "pressure" tubing or "four-ply insertion" tubing) leads from the suction pipe to a gallon bottle under the operating table. It is essential that non-collapsible tubing be used. From this bottle a comparatively short hose of the above material leads to the operating field. When instruments are prepared for operations, the suction tip and the rubber tube leading from the bottle to the field of operation are boiled as routine and are always ready for instant use.

TRANSACTIONS

OF THE

PHILADELPHIA ACADEMY OF SURGERY.

Stated Meeting, held April 7, 1913.

DR. GWILYM G. DAVIS, President, in the Chair.

SPOROTRICHOSIS.

DR. MORRIS BOOTH MILLER presented a man of 51, who, while engaged in his work, that of handling tin scrap (including old cans) prior to its reduction, received a small scratch from a piece of dirty tin on the flexor surface of his right forearm. This occurred over a year ago and since that time he has had one or more running sores in and about the elbow. While one area would heal another would break down. In consequence numerous scars can be seen surrounding the two or three sinuses which are now present. The area affected is the upper third of the forearm, about the elbow, and slightly above it, but at no time has there been any tendency to spread far from the original point of injury. There has been no involvement of the joint, or indeed to a greater depth than the subcutaneous tissue. The use of the arm is unimpaired in range and strength. The inflammation has been of a low grade and the discharge has always been thin and brownish and rather profuse. The sinuses show somewhat pale granulomata in abundance. Some of these were excised and the presence of the Sporothrix schencki was demonstrated in both of its forms, in the slender branching mycelia from smears and in the ovoid spores, about the size of a red blood corpuscle, in the granulation tissue.

Since this organism was first identified by Schenck, in 1898 (*Johns Hopkins Hosp. Bull.*, 1898, p. 286), it has been recognized as the cause of low grade inflammations of a chronic type affecting man. It also attacks some of the lower animals such as the dog and the horse. It has been carefully studied by the

French observers, De Beurmann and Gougerot, who have recently published a brochure on the subject. It has been observed on decaying vegetable matter and this was probably the source of the infection in the present case. The invasion is through the skin, and it travels along the lymphatics with the development of subcutaneous nodules. The discharge is usually brownish in color and gelatinous in consistency. According to Widal and Weil the spores agglutinate when mixed with serum in dilutions of from 1–200 to 1–500.

The treatment is simple and efficacious, consisting of the local application of dilute solutions of iodine and the internal administration of full doses of iodide of potassium.

SPLENECTOMY FOR BANTI'S DISEASE.

Dr. J. Chalmers DaCosta showed a spleen he had recently removed from a patient who was the victim of Banti's disease. He stated his belief that a very large spleen, if free from adhesions, can be more easily removed than a much smaller spleen, because, when the spleen is much enlarged the pedicle is thrown toward the front and into a region where it is readily accessible. The patient recovered. About 10 days after the operation he developed grievous pains in the ribs, sternum, vertebræ and the bones of the extremities, due doubtless to over stimulation of the marrow. These pains lasted for a number of days. There was a decided leucocytosis.

SUBFASCIAL TUBERCLE.

Dr. DaCosta exhibited a painful tubercle removed from between the fibres of the left great pectoral muscle. It had all the characteristics, clinical and microscopical, of a painful subcutaneous tubercle and yet it was subfascial. The description given by Paget of the symptoms of a subcutaneous tubercle were exactly imitated in this case. Paget's description written more than 50 years ago is still copied by most modern writers.

DENTIGEROUS CYST.

Dr. DaCosta also showed a dentigerous cyst (follicular odontome), removed from the right upper jaw of a negro, eighteen years of age. The X-ray picture, taken before operation, showed

a retained tooth under the orbit. The maxilla was short one canine tooth which had not erupted. The cyst was removed intact and the tooth was shown to be well developed. The cyst contained straw colored fluid and the walls contained embryonic dental tissue. Dr. DaCosta exhibited the patient in order to show how little deformity had resulted from the operation.

Dr. Morris Booth Miller reported some further facts regarding my case of symmetrical odontoma, simulating one of the cases reported. After exhibiting this patient to the Academy at the March meeting he operated and found that the overgrowth was solid and apparently made up of cancellated bone tissue, not cystic as he had supposed. It was probably an adamantine odontoma as only the alveolar portion of the jaw was involved. The perfect symmetry and the simultaneous involvement of both jaws characterizes this case as an exceedingly rare form.

OPERATIVE REDUCTION OF OLD DISLOCATION OF THE SHOULDER.

Dr. John H. Jopson reported the case of a woman, aged fifty-eight years, who was admitted to the Polyclinic Hospital November 25, 1912, and discharged January 31, 1913.

She gave a history of a fall and injury of her right shoulder about two and a half months previously. The arm was treated by bandages and fixation for three weeks after which she removed them. Limitation of motion had continued since that time. Examination of the shoulder showed an unreduced subcoracoid dislocation to be present. The usual symptoms of an old luxation were observed, except that pain was not much complained of.

On November 27 reduction under ether was attempted. Prolonged attempts at reduction by the Kocher, and other methods, failed to replace the head of the humerus in the glenoid cavity, although its position seemed somewhat improved. Subsequent examinations showed that the head of the bone was still beneath the coracoid and this was confirmed by radiographs which also demonstrated an old healed fracture of the tuberosities (Fig. 1).

Open operation was recommended and consented to, but owing to the development of an obstinate bronchitis, it was delayed

FIG. 1.

Subcoracoid dislocation of shoulder. Healed fracture of tuberosities.

FIG. 2.

Subcoracoid dislocation. Healed fracture of greater tuberosity.

until January 3, 1913. Through an anterior incision between the deltoid and the pectoralis major muscles the head of the bone was exposed surrounded by an adventitious capsule. There was a healed fracture extending partially through the tuberosities, and a fracture of the anterior inferior edge of the glenoid cavity, which fragment was removed. The capsule was closely adherent to the surface of the glenoid cavity and had to be stripped away from it. The pectoralis minor and coracobrachialis muscles were divided transversely, but the head of the bone could not be brought into its normal relation with the glenoid cavity until some of the anterior and outer fibres of the capsule were also incised, when reduction could be effected, and the capsule was then repaired around the head of the bone. The coracobrachialis was sutured, the pectoralis minor was not. The long head of the biceps tendon was not recognized, and probably not divided. A rubber drain was inserted and the wound was sutured. The arm was dressed in the Velpeau position, in which position there was less tendency for the head of the humerus to slip out of its socket.

The operative result of this case is very gratifying. An X-ray made three weeks later showed the reduction to be perfect (Fig. 2). At the present time, although the patient has had no systematic massage, the restoration of function is progressing rapidly. The patient uses her arm without pain, and is doing some work. There is still marked limitation of abduction, partly compensated by movement of the scapula, but this limitation is decreasing quite rapidly and there is every reason to believe that the final result will be a highly satisfactory one.

Dr. Jopson further remarked that A. F. Jonas reports 11 cases of old dislocation of the shoulder-joint, of which 9 were treated by open incision, reduction being effected in 7 of these, while in 2 the head of the humerus was excised. Hotchkiss operated on 8 cases, reducing 5, after arthrotomy, and resecting 3. In these old dislocations of the shoulder which are not reducible by bloodless manipulations, and this should nearly always be given a trial, arthrotomy offers about 75 per cent. of chances of reduction, while in the remaining 25 per cent. excision will be necessary. The anterior method of approach, either in the pectorodeltoid interspace or as Hotchkiss prefers, transverse division of the fibres of the pectoralis major (Andrews), is the

favorite. Muscles which prevent reduction must be divided and can be subsequently sutured. Portions of the joint capsule often require excision. The mortality is very low, almost nil, and while the final result, as Jonas says, leaves much to be desired, there is oftentimes very fair restoration of function along with relief of pain and circulatory disturbances due to pressure.

Dr. T. Turner Thomas said that after study and analysis of the cases he had seen and those he had read of, and of the cadaver dislocation, he had found that the structure which held and which must be overcome to get reduction in these cases was just such a portion of the capsule as Dr. Jopson had mentioned. It ought to be borne in mind, however, that in this case the real trouble still exists, the limitation of movement, and just what the patient will get ultimately is the important thing. In his own work, his trouble was not so much in the reduction as in getting good use of the arm afterward, and he had given up in some cases all hope of normal function. In one case he reported there was a dislocation on each side, one of four years and four months' standing and one of only four months' standing; he reduced the latter without operation but failed to reduce the former; however, the reduced dislocation was later the worse of the two, as it allowed of less movement and gave more pain. As time goes on there are changes in the joint making normal function difficult. Another thing was the fact that Dr. Jopson did not find the long head of the biceps. He had tried to show that the mechanism of the tearing away of the glenoid attachment of the long head of the biceps was the mechanism of the fracture of the greater tuberosity. In his patient with double dislocation, he operated on the reduced side more than a year after the reduction to see if he could improve the conditions, and found the long head of the biceps had been torn away and that the detached end was considerably below its normal level and adherent in its bony groove. It had very much atrophied. He suspected that the tendon in Dr. Jopson's case had torn away and was not cut but was adherent in bicipital groove. So far as he could see the results in this case do not prove that operative treatment was the best for all cases or even for cases after four, five or six weeks, as has been advised by Dollinger, who says that if we divide the subscapularis we can get them back easily.

DR. JOHN H. JOPSON reported that this patient was pretty well satisfied with the result of this arthroplasty and he thought it would be a step backward to leave these patients without operative treatment. There is no reason why in an old dislocation of the shoulder, in addition to the restoration of function, one should not aim to relieve the pressure on the brachial plexus and to relieve the circulatory disturbances and this can only be effected by reduction or excision.

MIXED CELLED SARCOMA OF THE LOWER LIP.

DR. L. H. LANDON, in reporting a case-history, remarked that the occurrence of sarcoma of the lip is apparently extremely rare, although a considerable number of cases have probably been overlooked and taken for epithelioma because of its rarity, difficulty of diagnosis, and lack of, or improper microscopical examination. None of the standard text-books make reference to it, except the 1898 edition of *Duplay and Reclus' Surgery,* in which its rarity is commented upon and two cases reported in both of which there is reason to believe that the growth was primarily of the gum with involvement of the lip. One of these cases, seen by Vidal, was of the melanotic variety, the other reported by Suttegast was mixed celled.

Except for these two cases, a careful review of the literature has revealed but nine cases, only three of which were proven to be true primary sarcoma of the lip.

In 1897 (*New York Post-Graduate,* 1897, vol. xii, p. 346), Coley, in a clinical lecture, showed a little girl aged five. In September, 1896, there was first noticed a small spot resembling a mosquito bite ½ inch below the mucocutaneous line on the right side. Four months later, although not regarded as malignant, it was removed and the specimen preserved in alcohol. In October it began to reappear and an examination then made of the previous specimen showed a round-celled sarcoma. It was then about the size of a pea and markedly indurated. A wide excision was done with recurrence a few weeks later in the scar. Feeling further operation of no avail, she was brought to Coley for treatment with his toxins with later excision of the scar. In April, 1897, the child was free from recurrence.

The second case was reported by Maunsell in 1899 (*Trans. Royal Acad. Med., Dublin, Ireland,* 1899, vol. xviii. p. 326), a mixed celled sarcoma in the lower lip of a female of thirty-two years. It was of three months' duration with no metastasis.

In discussing this case, E. J. McWeenly menticned a case of

lymphangiosarcoma in the lower lip of a child aged ten, suspected by the surgeon of being sarcoma.

In 1909 (*Proceed. Societe Anatomique de Paris,* February 5), Hardouin reported the case of a young woman twenty-two years old, with a large globocelled sarcoma on the left upper lip. The pre-operative diagnosis was angioma. The lip was greatly enlarged and deformed and the growth had infiltrated the muscles of the region.

The difficulty of diagnosis between sarcoma and epithelioma, both clinically and microscopically, is demonstrated by the following case mentioned by Coley (*New York Med. Jour.,* 1891, liii, p. 706), the growth being on the right lower lip of a male of forty-five. The appearance and clinical history pointed to epithelioma; careful microscopical examination by the pathologist reported it as sarcoma. Two months later recurrence in the submaxillary and deep cervical nodes. Excision. The microscope showed the disease to be unquestionably epithelioma which at first had been so disguised by inflammatory reaction that it was mistaken for sarcoma.

The following five cases, together with the one just cited, although occurring in literature on this subject, seem to us either not to have been primarily sarcoma, or to have been sarcoma originating in neighboring structures with secondary involvement of the lip.

A case reported by M. Geraud (*Proceed. Societe Anatomique de Paris,* March 4, 1902). A small tumor removed from the lower lip of a young woman which had developed in about three weeks, had reached the size of a pea, and presented the characteristics of a telangiectatic sarcoma.

A case mentioned by M. Schwartz (*Societe de Chirurgie de Paris,* May 20, 1903), having a fusocelled sarcoma of the cheek involving the lip, in a man sixty-six years of age. The tumor weighed two kilogrammes.

Langston (*Indian Med. Gaz.,* Calcutta, July, 1909) writes of a case resembling macrocheilia, involving the whole lower lip, with an ulcerated, bleeding surface, having many resemblances to lymphangioma-cavernosum. The patient, however, gave a history of always having had a very large lip growing more in the last three years but with no glandular involvement and no secondary deposits anywhere. Microscopically the report was a large celled sarcoma. This was probably a macrocheilia with a nucleus of embryonic tissue, taking on active growth in middle life, or else an angiosarcoma congenital, in which the sarcomatous element had remained dormant for a long period of time and then became active.

Steeves (*Trans. Path. Soc.,* London, xxxvii, pp. 85–86) also mentions the case of a small melanotic growth on the upper lip of a female aged thirty-seven. There had been no previous mole or pigment spot. It was removed with recurrence locally and in the cheek and submaxillary nodes,

with death in nine months. Autopsy showed no distant metastasis. The pathological report was uncertain as to whether it was a melanotic sarcoma or a carcinoma-melanodes but as it was composed of alveoli containing epithelial cells with only slight stroma some of the cells of which were pigmented, it corresponded very closely to the description by Kaposi in *Die Hautkrankheiten*, of carcinoma-melanodes, and was probably such.

Eugene Hodenpyl (*Proceed. New York Path. Soc.*, April 8, 1891) presented a microscopical specimen of a tumor removed from the upper lip of a man aged fifty. Five years before a pimple had appeared. It was removed two years later and soon after the present growth occurred. The microscopical findings in this case were remarkable as different portions of the tumor presented respectively, myxomatous, cartilaginous, glandular and sarcomatous tissue, the connective tissue being principally derived from the fibrous capsule.

Prudden said in discussing this case, that hand in hand with the proliferation of the glandular elements, it was not unusual to have a simple hyperplasia of the fibrous tissue. Myxomatous tissue is closely allied to sarcomatous and when hyperplasia is added to this, the difficulty of differentiating it from sarcoma is rendered still greater.

Dr. Landon's attention was first called to this subject by a patient under the care of Dr. Frazier at the University Hospital to which he was admitted October 3, 1912. The patient, an elderly man of 76 years, gave the following history: About two years before he had been stung by an insect at the site of the present sore. A small lesion resembling a fever blister had resulted which under simple treatment seemed to heal only to break out again repeatedly until about four months ago, it began to enlarge and the surface became ulcerated. It had given him no pain. Other points in the history were negative. He did not use tobacco at all and alcohol only moderately.

Upon examination, there was presented a poorly nourished elderly male with the usual evidences of senile changes. Careful examination failed to show any changes other than those incident to his age except in the affected region. On the lower lip, near the mucocutaneous junction and close to the midline was a rounded mass about one and one-half centimetres in diameter, the ulcerated surface of which was covered by a dirty scab, the removal of which left a freely bleeding irregular surface. The base of the growth was indurated; the growth was not tender, and did not extend to or involve the gums. In many respects the growth had the appearance of an epithelioma and was so regarded until the pathological report was received. The

submaxillary nodes on both sides were enlarged, hard and partially fixed, the left more than those on the right side. The anterior cervical nodes were also palpable but freely movable. His blood showed a moderate anæmia with 11,200 leucocytes.

On October 7, under intratracheal anæsthesia, through oblique incisions, the submaxillary glands, lymph nodes and lymph bearing tissue were removed and after closure of the wounds, the primary growth was excised, together with a square block of tissue representing a considerable portion of the lip and chin.

The pathological examination of the specimen showed a normal squamous epithelial covering except where the ulceration was present. Beneath this and extending for one centimetre into the subcutaneous and muscular tissue, was an area composed chiefly of spindle cells, arranged in more or less definite bands. The cells were extremely irregular in size and staining qualities. The tissue, entirely cellular in character, presented all the characteristics of a mixed celled sarcoma, apparently of a rather malignant type. At its lower edge the tumor could be seen distinctly infiltrating the muscular tissue.

The lymph nodes showed microscopically almost complete transformation into tissue similar to that just described. Only here and there were portions of normal lymphoid tissue to be seen.

The plan of operation in this case was modified somewhat from that which Dr. Frazier usually employs. Ordinarily a complete block dissection of the anterior triangle of the neck is made, prior to removal of the primary lesion. When the growth is a unilateral one, this dissection is confined to one side of the neck. In the case under consideration, on account of the advanced age of the patient, the dissection was confined to the submaxillary region and did not include the entire anterior triangle.

The patient reacted promptly from the effects of the operation and was discharged from the hospital on the eleventh day. One month later he noticed the appearance of enlarged nodes on both sides along the borders of the sternocleidomastoid muscles, and two months after a second operation was performed at which the infiltrated muscle together with a mass of enlarged glands was removed on the right side. Although only

two months had elapsed since the first operation, the progress of the disease had been so rapid that the case was regarded as hopeless and no attempt was made to attack the opposite side.

Pathological examination of the tissue removed as at the first examination showed mixed celled sarcoma of the lymph nodes, the growth appearing to be extremely active.

The patient was discharged from the hospital on December 25, but from then on the rapidity and virulency of the growth were much more marked. The upper lip, tongue, and floor of the mouth became extensively involved and he died on March 3, with still no clinical evidences of distant metastasis.

In considering these cases, three facts stand out prominently; their slowness of growth and apparent insignificance up to the time of operation with little or no systemic effects; their quick recurrence, with greatly increased virulency, following operation; and their apparent localization with no distant metastasis even up to the time of death.

Whether or not in this case the continuation of the lymph metastasis and the eventual outcome of the disease, would have been influenced by a more painstaking and thorough block dissection of the neck, is quite problematical. There was not in this case as in some of the others recorded, any local recurrence but rather an extension to other lymph node groups. In a lymphosarcoma, we are dealing with one of the most malignant of tumors, a lesion in no wise comparable to that of epithelioma and had the true nature of the lesion been known before the operation, the course pursued might have been modified.

W. J. Mayo (*Jour. A. M. A.*, Feb. 15, 1913) particularly has called attention to the danger and frequency of the traumatic dissemination of malignant disease during operative manipulations, especially those in the breast, gastro-intestinal tract, and female pelvis. Wherever during the removal of malignant growths, it becomes necessary to preserve contiguous structures which are approximated or surrounded by the disease, one cannot expect to separate them or preserve them without carrying and spreading the malignant infection throughout the wound. There is no more favorable seat for this traumatic dissemination and grafting than in the cervical region, where certain important structures must be preserved. The use of the cautery knife is claimed by some to be effectual in preventing the dissemination

of the disease during operative manipulations and there is much to be said in its favor. The rapid dissemination of a lesion as malignant as sarcoma is surely to be expected if any malignant cells have been left behind, in a field where so many lymphatic channels have been opened and I am inclined to believe that the use of Harrington's solution may be effective in sealing the lymphatic channels, destroying cells and leaving a less fertile field for cellular proliferation.

SIMULTANEOUS FRACTURE OF BOTH PATELLÆ.

Dr. Carl R. Steinke read a paper entitled "Simultaneous Fracture of Both Patellæ; Report of Two Cases and Review of Literature," for which see page 510.

FRACTURE THROUGH THE TROCHANTERS OF THE FEMUR.

Dr. Astley P. C. Ashhurst read a paper on "Fracture Through the Trochanters of the Femur," for which see page 494.

TREATMENT OF TUBERCULOUS CERVICAL LYMPHADENITIS.

Dr. George P. Müller read a paper with the above title, for which see page 433.

Dr. Astley P. C. Ashhurst said that the main thing in tuberculous cervical adenitis was to recognize that it is not a disease in itself but is secondary to an infection some place else, and one may do all the operations one wants, but if the patients have pediculi or decayed teeth, or infections of the nasopharynx, etc., which are left untreated, recurrence of the cervical adenitis is almost certain. Unless one finds out the source of the infection and cures that, there is little use in removing the secondary lesion in the neck. Whether at an operation one can remove all the lymph nodes he did not know. In the dissecting room he had found them to go down beneath the scalene muscles and across the mid-line behind the trachea, so that it seemed to him impossible to believe that one can take them all out during life in every case. Theoretically, however, the lymph nodes do not extend beneath the deep fascia. The operation always is difficult and should not be undertaken by those who are not good anatomists and who do not know how to dissect.

Hemorrhage may be dangerous and one must be prepared for it. Once he had to ligate the internal jugular vein and the

patient was blue in the face from the sudden shutting off of the return flow from the head, and remained in a comatose condition for several days. He had also seen cases where nerves have been injured; one girl at the first operation had the hypoglossal cut and at the second operation the long thoracic nerve.

He is a firm believer in the value of operative treatment in all cases, and at the meeting of this Academy in November, 1908, he reported a case of his own in which temporary paralysis of the left vocal cord followed an extensive operation for tuberculous cervical adenitis; but except for this instance, from which recovery was complete, he has not had the misfortune so far to injure any of the cervical nerves at operation, except sometimes the branch of the facial to the depressor anguli oris.

Dr. Charles H. Frazier thought that Dr. Müller had brought out two important points, first that this condition of tuberculous lymphadenitis is a major condition requiring a major operation and should not be left to the end of a long clinic when the operator is tired out, but should be done when the surgeon is fresh. Secondly, and perhaps most important, is the selection of the time for operation. On so many occasions patients are referred to the surgeon with broken down areas, with mixed infection, it is expected that not only the abscess cavity will be evacuated but that at this time also the lymph nodes will be removed. Dr. Müller has referred to the undesirability of operating at this time; the abscess cavity should be evacuated but the radical procedure should be postponed until this cavity has become obliterated or converted into a simple sinus.

Dr. Emory G. Alexander said that he had used for the past three years at the Mary J. Drexel Home for Children, the tuberculin treatment. The results had been most gratifying and it has reduced the number of operations considerably. In all the cases any source of infection in the mouth, throat and nasal passages, such as carious teeth, hypertrophied tonsils and adenoids were removed, and then the patients were given general hygienic treatment, syrup of iodide of iron, and tuberculin. Of course, the question is open for argument that it is the hygienic treatment, the removal of the source of infection, etc., and not the tuberculin that produces the result; but they never got the results they are getting to-day until they began the

tuberculin treatment. They have had no bad effects from the tuberculin, as they begin with a small dose and increase it gradually every five to seven days, watching closely for any marked reaction.

Dr. George P. Müller (in closing) called attention, in regard to tuberculin, to the fact that in many of these cases the element of time is an important one. Operation removes the focus of infection entirely or partially at one stroke and if the operation is performed early and properly, practically every wound should heal within ten days. The patient can then be treated with much greater advantage by the various other methods. Tuberculin treatment without operation is long drawn out, requiring many months or years and at least a weekly visit to the physician or dispensary. An examination of the existing statistics shows results of only about 60 per cent. recovery and improvement, whereas the statistics as shown in my paper give better results from operation. Furthermore, it is probable that many of these patients would have recovered under purely hygienic regulations. There is nothing magical or marvellous about tuberculin. It merely stimulates resistance. Many cases do not do well under tuberculin and sometimes serious results have occurred.

OPERATIONS IN THE CLINIC OF THE PROTESTANT EPISCOPAL HOSPITAL OF PHILADELPHIA.

Dr. Charles H. Frazier read this paper.

TRANSACTIONS

OF THE

NEW YORK SURGICAL SOCIETY.

Stated Meeting, held at the New York Academy of Medicine, April 9, 1913.

The President, Dr. Charles L. Gibson, in the Chair.

CHYLO-ASCITES OF TRAUMATIC ORIGIN.

Dr. Howard D. Collins presented a boy, white, nine years old, who on December 13, 1912, was struck by an automobile. He was brought to the J. Hood Wright Hospital, but his parents wished to take him home, and as no lesion was found, he was allowed to go. He was brought back two days later complaining of some abdominal tenderness, with moderate pain and distention, and a temperature of 102.4°. Within two days his symptoms subsided and he returned home.

The boy was readmitted to the hospital on March 11, 1913, with the history that since December 18, 1912, there had been slight but persistent abdominal distress, with increasing distention and marked loss of weight and strength. Upon examination, the abdomen was found to be much distended by fluid, and in the absence of other signs the case was regarded as one of tubercular peritonitis.

Operation, March 12, 1913: Through a median incision, a large quantity (perhaps 30 ounces) of a white fluid escaped from the general peritoneal cavity, and a loop of small intestine which was exposed showed every chyle radical enormously distended. Upon further exploration, a cystic retroperitoneal tumor was found in the region of the pancreas, and upon incising this, about sixteen ounces of a clear, coffee-colored fluid escaped. The mouth of this sac was sutured to the edge of the incision, and drained with gauze. The boy made an uneventful recovery from the operation, but the abdominal distention recurred and

was still very pronounced. The general appearance of the patient had somewhat improved.

Upon examination, the white fluid removed from the abdomen was found to be neutral in reaction; it had a specific gravity of 1008, and contained a heavy precipitate of albumen, a distinct trace of sugar, with fat globules and fatty acid crystals. It was doubtless chyle. The coffee-colored fluid found in the retroperitoneal cyst was neutral, with a specific gravity of 1012, and contained a slight trace of albumen; no sugar. Microscopically it was negative, and there were no evidences of pancreatic ferments.

Dr. Arpad G. Gerster said that from the history of the case shown by Dr. Collins one would be justified to assume that a direct rupture of the thoracic duct had occurred, and such a lesion would be very probable if it could be shown that the distention of the abdomen came on shortly after the injury.

Dr. F. Kammerer said he agreed with Dr. Gerster that the history of Dr. Collins' case pointed rather to a lesion of the thoracic duct, and not to simple compression of the duct by a comparatively small cystic tumor.

Dr. Collins, in reply to a question, said that so far as he could learn from the boy's parents, the abdominal distention came on gradually—not suddenly, as one would expect in a case of rupture of the thoracic duct.

ACUTE PHLEGMON OF THE ASCENDING COLON: BEGINNING INTUSSUSCEPTION OF THE CAPUT COLI, ASSOCIATED WITH THE PRESENCE OF THREAD WORMS. RESECTION.

Dr. Collins presented a negro boy, eleven years old, who came from Trinidad two months ago, and was admitted to the J. Hood Wright Hospital on March 10, 1913, with the history that for two days he had suffered from abdominal pain, paroxysmal in character, and of increasing severity.

Examination showed marked right-sided rigidity of the abdomen, and under ether, a sausage shaped mass, three inches long, could be made out on that side. Upon opening the abdomen in the midline, the ascending colon was found to be greatly thickened, with œdema of its walls, so that the lumen of that section of the gut was almost occluded. There was beginning intussusception of the floor of the caput coli. The lymph nodes of the

mesentery of the ascending colon were much enlarged. The appendix and the ileocæcal valve were not involved.

A resection of the ascending colon was done from a point two inches proximal to the ileocæcal valve to three inches distal to the hepatic flexure, with end-to-end anastomosis. The abdominal wound was then closed.

Upon splitting up the excised segment of the colon, it was found to contain many thread worms (oxyuris), with evidences of beginning gangrene at the point of intussusception. The patient made an uneventful recovery, and left the hospital on April 9, 1913.

DOUBLE PERFORATION OF THE DUODENUM.

DR. CHAS. L. GIBSON showed a man, twenty-seven years old, of temperate habits, who was admitted to the New York Hospital on February 7, 1913, with the history that for two years past he had been suffering from gastric disturbance, characterized chiefly by pain in the epigastrium, with considerable nausea and occasional vomiting. On the morning of the day of his admission he had had a sudden, sharp pain in the epigastric region and went into a collapse. When Dr. Gibson first saw him, about eight or nine hours later, he complained of intense abdominal pain, but there was nothing definite upon which to base the diagnosis of intestinal perforation.

Upon opening the abdomen, two actively discharging perforations of the duodenum were found, one at the pylorus, the other about an inch lower. They were both closed with purse-string sutures, and although these seemed to give rise to a slight constriction, Dr. Gibson said he refrained from doing a gastro-enterostomy, which he thought was seldom indicated in dealing with these acute cases.

The man made a perfectly normal recovery, and left the hospital in ten days. At that time he was eating solid food and was entirely free from gastric symptoms. Whether a gastro-enterostomy would eventually become necessary in this case remained to be seen.

CERVICAL RIB.

DR. GIBSON showed two cases of cervical rib, one in a male, the other in a female. The speaker said he had seen four examples of this anomaly in a comparatively short space of time.

and he simply showed these, together with the radiographic findings, in order to emphasize the frequency of a condition which was so often overlooked.

These patients sometimes had more or less throat or pulmonary irritation, due to the presence of the supernumerary rib, and in one of his cases the patient had been rejected for life insurance because of suspected pulmonary trouble. Dr. Gibson said that in one of his cases, which he was unable to show, the condition was bilateral.

Dr. Kammerer said that about thirteen years ago he showed a case to this society, in which he had removed a cervical rib that had caused serious pressure symptoms, evidently producing a thrombosis of the brachial artery or its branches. The pulse in the vessels of the arm was absent before operation and had not returned some time after a portion of the rib had been removed. All the symptoms referable to pressure on the plexus were, however, permanently relieved in his case.

SARCOMA OF CLAVICLE—EXCISION FOLLOWED BY TOXIN TREATMENT.

Dr. William B. Coley presented a boy, twelve years old, who came to the Hospital for the Ruptured and Crippled on December 16, 1912, with the history that five weeks previously he had fallen off a stepladder and struck the region of the right clavicle against a wooden box. Two weeks later a swelling appeared on the inner extremity of the right clavicle; it was painless, apparently attached to the bone and had rapidly increased in size.

Examination on December 17 showed a tumor, about the size of a hen's egg, markedly protuberant in the region of the sternum and right clavicle. It apparently involved the inner half of the clavicle and occupied the entire suprasternal region. It was soft in consistence, almost fluctuating in some parts, denser in others. The skin was not adherent, but the superficial veins were considerably dilated.

Dr. Coley said he made a clinical diagnosis of periosteal sarcoma of extreme malignancy, and advised total excision of the clavicle. The X-ray photographs showed almost complete destruction of the inner third of the right clavicle. The operation was performed on December 20, 1912, an incision being made

beginning just above the sternum, over the inner junction of the tumor, and carried around to the outer extremity of the right clavicle, down to the normal bone, and the clavicle was then sawn through about two inches from its outer extremity. Lifting up the inner portion by means of a lion-tooth forceps, the tumor was carefully dissected from its deep attachments. There was practically no bleeding. The growth was extremely soft in areas, and a small portion of it exuded through the wound. There was very slight shock. The wound was closed, with cigarette drain.

The specimen was submitted to Dr. James Ewing, who reported as follows:

Specimen consists of clavicle which fractured about the middle point, where it runs directly into the tumor mass. Periosteum strips easily; shaft of bone is eroded beneath it. The outer end of clavicle is largely destroyed by tumor growth, which has split up layers of periosteum and bone shaft, and invaded the surrounding muscle for a distance of one-half cm., producing a rounded tumor in this region.

The gross appearance is not distinctive of either central or periosteal sarcoma. The outer end of the bone is much thickened, and the bone is irregularly absorbed. Through the centre of the globular mass of tumor runs a sharp, white line, indicating periosteum, beyond which the tumor infiltrates muscle and fat.

Histology.—The tumor belongs in a class commonly called small, round-celled sarcoma. The cells are small, 10–12 micr. in diameter, with poorly defined cytoplasm, hyperchromatic vesicular nuclei. The shape, where preserved, is polyhedral; cell bodies are clear; arrangement is diffuse, the cells often sheathing numerous small blood vessels. Size of cells remarkably uniform. One large artery is filled by mural tumor thrombus. Muscle extensively invaded and destroyed by diffuse focal growth of tumor cells. Histological indications are highly malignant. Exact source of the cells undetermined.

Ten days after the operation there was a marked swelling at the site of the old tumor, having every appearance of a local recurrence. The patient was then put upon the mixed toxins, which were continued daily until a reaction of 102° or 103° F. was obtained. At the end of two weeks the swelling had disappeared, and there had been no return. The toxins were continued for two months, and then the treatment was left off for two weeks, during which interim the patient gained rapidly in weight. The toxins were then resumed, and the second period of treatment terminated a week ago.

Dr. Coley said his first case of round-celled sarcoma of the clavicle in which he performed total excision was shown at a meeting of the New York Surgical Society about two years ago. That case bore a striking similarity to that shown to-night in the fact that it followed almost immediately after a trauma. In that case the injury was not a direct blow, but a severe strain caused by the patient trying to save himself from a fall by catching hold of the stair-banister with his left hand. The tumor in that case, apparently, was of periosteal origin, and about the size of an English walnut. There was no pain until about three weeks before the operation. Before leaving the hospital the patient was put upon the mixed toxins of erysipelas and bacillus prodigiosus, and the treatment was continued in small doses by his family physician for three months longer. At the present time, nearly three and a half years later, the patient remains in good health and an important engagement prevented him from being present this evening.

Dr. Coley said that of the ten cases of sarcoma of the clavicle that had come under his personal observation, eight gave a distinct history of an antecedent trauma. Sarcoma of the clavicle was apparently one of the most malignant of all new growths. Norkes, in 1893 (*Beitr. z. Klin. Chir.*, Bd. xi, p. 729), was able to collect 32 cases of total excision of the clavicle for malignant disease, to which Dr. Coley, in his paper read before the American Surgical Association in 1910, was able to add 20 further cases found in the literature, and twelve unreported cases, including one of his own.

As to the results, eleven of the cases died of the operation. In seven a recurrence was noted within the first six months after operation. Only six were well at the time of observation. Only three of the 64 were known to have been permanently cured, one fifty years, one ten and one five years. (The case of Dr. Delatour, well five years after excision, had escaped Dr. Coley's notice when he published his paper.)

Since the publication of his paper in 1910, the number of cases well beyond three years had been somewhat enlarged. His own case had now remained free from recurrence for over three years; the case reported by Dr. Maurice H. Richardson, of Boston, was well over five years, and the case of Dr. Thomas W. Huntington, of San Francisco, was well four and a half

years. It was interesting to note that in the three latter cases the toxins were used for a considerable period after operation.

The further experience with sarcoma of the clavicle and the longer period of observation of after-results only tended to still further confirm the conclusions which Dr. Coley said he had expressed in his paper in 1910; these were:

1. That primary sarcoma of the clavicle, while a rare condition, required very early diagnosis and very radical treatment—total or partial excision as soon as the diagnosis had been made.

2. That the mortality of the operation performed under modern aseptic conditions should be very small.

3. The danger of early local or general metastases was very great.

4. In view of the favorable results obtained in the few cases of sarcoma of the clavicle, and the much larger number of sarcoma of the long bones in general by the use of the mixed toxins of erysipelas and bacillus prodigiosus immediately after operation as a prophylactic, such use would seem to be strongly indicated as a routine measure.

INOPERABLE ADENOCARCINOMA OF THE SOFT PALATE, RENDERED OPERABLE BY THE USE OF THE MIXED TOXINS.

Dr. Coley presented a man, fifty-two years old, who was referred to him by the late Dr. William F. Dudley, of Brooklyn, on June 1, 1912. The patient had always been well until six months before, when he noticed a swelling just behind the soft palate. This was treated by Dr. Dudley, but the growth continued to increase in size.

When Dr. Coley saw the patient, in June, 1912, the soft palate was pressed forward, bulging into the cavity of the mouth. The space behind the palate was practically filled by a large tumor which interfered considerably with speech and swallowing. On palpation, a smooth, rounded tumor was found; it was moderately firm in consistence, situated behind the soft palate and extending backward, but its point of origin could not be made out. The patient was admitted to the General Memorial Hospital two days later and was put upon the mixed toxins, the injections being

made in the pectoral region. A week later an exploratory incision was made in order to obtain material for microscopic examination. This was submitted to Dr. Ewing, who reported as follows:

> I think the tumor of the palate must stand as an adenocarcinoma. It is made up of small alveoli lying in hyaline or mucoid struma Most of the alveoli are intact; some are carcinomatous and diffuse. The tumor probably arises from the mucous glands of the palate. It is not at present very malignant, and a thorough extirpation ought to cure.

The mixed toxins were continued locally and systemically, and under this treatment the tumor showed marked diminution in size and became less diffuse and more discrete, so that its outline could be more easily defined. It also became harder in consistence, so that the needle entered with difficulty. The local injections produced fairly severe reactions, a temperature of from 102° to 104° being obtained with from one-third to one-half mm. doses.

In view of the decrease in size of the tumor, the patient was operated on August 1, 1912, under ether anæsthesia and after preliminary ligation of the external carotid. Through an oblique incision through the soft palate, two and a half inches long, an attempt was made to remove as much as possible of the growth. It was about the size of a small egg, fairly well encapsulated, and extended backward and downward for about two inches. It was found impossible to remove the capsule, and the curette and scissors had to be employed. The wound healed rapidly and the patient was sent to the country for two weeks to recuperate, after which he resumed his occupation.

An examination, made on April 7, 1913, showed nothing but scar tissue at the site of the wound. The toxins had been continued, twice weekly, by his family physician, which in no wise interfered with the patient's occupation. His general condition is good, and he now weighs more than at any previous time.

A second microscopic examination, made by Dr. Ewing, confirmed the diagnosis of adenocarcinoma.

Dr. Howard Lilienthal said his experience with Coley's fluid, both in inoperable sarcoma and as a post-operative precaution against recurrence in carcinoma, had convinced him of

its value. In a case of lymphosarcoma of the ileocæcal region where he resected the malignant growth and did an ileocolostomy, and where complete extirpation of the involved tissues was manifestly impossible, Coley's fluid was used as a post-operative measure, and the man apparently entirely recovered. Four years later he developed a lymphosarcoma of the left tonsil, which was operated on by Dr. Charles A. Elsberg, who removed as much of the involved area as possible. The patient was again put on Coley's fluid, and he again rapidly improved in health and had now remained well for two years.

These and other similar experiences, Dr. Lilienthal said, had convinced him that this method of treatment had not received the credit it deserved.

HYDROCELE OF THE TUNICA VAGINALIS: TWO RECURRENCES AFTER THE WINKELMANN OPERATION.

Dr. A. V. Moschcowitz presented a boy, eleven years old, who was operated on for a hydrocele of the tunica vaginalis at a hospital in a neighboring city five years ago; the condition soon recurred and three years later he was again operated on by the same surgeon, and again the operation was followed by a rapid recurrence.

Dr. Moschcowitz operated on the boy at the Har Moriah Hospital on March 21, 1913. On account of the two preceding Winkelmann operations, the third operation was exceedingly tedious and difficult, but he finally succeeded in extirpating all of the parietal serosa. At the same time he extirpated an empty hernial sac which extended into the scrotum, and closed the inguinal canal in a radical manner.

This case, Dr. Moschcowitz said, was presented in connection with a discussion of this subject which took place before this Society on November 8, 1911, when Dr. H. H. M. Lyle presented a case of hydrocele in which a recurrence had taken place after the Winkelmann operation, and had referred to three additional cases out of a series of ten in which there had been recurrences. At that time, some of the members who were present spoke against the Winkelmann operation, while others favored it.

OMENTAL GRAFTING TO REPLACE SEROSA AND MUSCULARIS OF SMALL INTESTINE.

DR. MOSCHCOWITZ presented a man, twenty-one years old, who was admitted to the Mt. Sinai Hospital on March 3, 1913, with the indications of an acute appendicitis. He was immediately operated on by the house surgeon, who, upon opening the abdomen, had considerable difficulty in finding the appendix, and encountered at least four discrete abscesses, which were opened. Dr. Moschcowitz, who was awaiting the progress of the operation, noticed an adherent loop of small intestine, fully six inches in length, which was exposed in the wound, still attached to its mesentery, but absolutely devoid of any serosa or muscularis. He thereupon took charge of the operation personally, and found that the appendix was situated retrocæcally. As the outlook of a resection of devitalized segment of the intestine in such an infected field and with such extensive adhesions did not seem very promising, he brought into the field of operation a liberal portion of the omentum, and with it completely covered up the denuded loop, fastening it both in front and behind and at its two extremities with a few interrupted catgut sutures. The wound was drained with gauze, tubes and a rubber dam, but all disposed of in such a manner that nowhere did the gauze come in contact with the denuded loop of intestine or its new omental covering.

The patient was kept constipated for the first four days, and thereafter the bowels were moved with enemata. Gradually, all drainage was removed. There was no leakage, and no interference whatsoever with the bowel functions; in fact, the patient's convalescence was absolutely perfect in every respect, and he was discharged on April 6, 1913.

Dr. Moschcowitz said this case was presented in connection with the case of ileus which he showed two or three months ago, where the condition was caused by the tearing away of about four inches of small intestine from its mesentery. In that case, the intestine evidently remained viable through the influence of the omentum that had become adherent to it, but eventually, by cicatrization, the bowel had become contracted to such a degree that intestinal obstruction had occurred. The present case was a further example of how a loop of intestine could be kept viable by omental grafting. This patient would be kept under

observation, and should any complications arise, he would be glad to report them to the Society.

CYST OF THE TAIL OF THE PANCREAS.

DR. MOSCHCOWITZ presented a girl, thirteen years old, who was admitted to the Har Moriah Hospital on February 17, 1913. Both her family and past history were negative, and there was no history of any trauma. Ten days ago the girl began to complain of cramp-like pains in the left half of the abdomen. Upon the application of heat, these pains ceased for a time, only to recur with increasing severity. She vomited repeatedly and suffered from constipation, although her bowels could be moved with the aid of enemata.

On physical examination there could be seen and felt a large tumor which occupied the middle and lower thirds of the left abdomen. The mass was ovoid in shape and approximately the size of a large cocoanut. On account of the rigidity of the overlying abdominal muscles, its exact contour could not be well defined. It was very tense, of indefinite consistence and not very tender. It was slightly if at all movable and could be distinctly felt per rectum.

In the absence of any previous history, the diagnosis was believed to lay between a mesenteric cyst and a twisted ovarian cyst, with the probabilities in favor of the latter.

Operation, February 19, 1913: With the patient in the Trendelenburg position, through a median suprapubic incision which later had to be extended to a distance of about eight inches, it was found that the uterus and adnexa were perfectly normal. A large cystic tumor was seen extending from the pelvic brim upward and covered by adherent omentum. This was liberated from the cyst by blunt and sharp dissection. The cyst was so large and unwieldy as to preclude its extirpation *en masse,* and even its exact anatomical relations could not be definitely made out. It was thereupon aspirated, and fully two quarts of a clear fluid were evacuated. It could now be made out that the upper limits of the cyst extended beyond the stomach, into the angle formed by the pancreas and spleen, and as it was gradually freed from its attachments, the splenic vessels finally came into view as well as the tail of the pancreas, from which the final pedicle was excised. The entire wound was closed in

layers, without drainage. The patient made an uninterrupted recovery, and was discharged on March 9, 1913.

Histologically, the wall of the cyst was found to consist of dense connective tissue, containing abundant young connective tissue cells, fibroblasts and plasma cells. The inner lining of the cyst consisted of granulation tissue containing many newly-formed blood vessels. There was no epithelial lining to the cyst. In one or two of the sections taken from the neighborhood of the pedicle, distinct pancreatic alveoli were found.

BLOOD INJECTION FOR CURE OF UNUNITED FRACTURE.

DR. ARPAD G. GERSTER, in presenting this case, said experience with compound fractures in the human, as well as in experimental work on animals, had amply shown that the presence of effused blood about the fragments played an important part in the formation of an adequate callus. Based upon this circumstance, Bier had recommended the injection of fresh blood in tardy union after fractures. This treatment was so simple, and in the case shown had such a good result, that it was deemed to be worth while to present it to the Society.

The patient was a painter, forty-two years old, of prematurely senile habitus, who, six and a half months before admission to the hospital, sustained a fracture of both the tibia and the fibula. Ever since then his limb had been encased in plaster of Paris, which was applied at another hospital. The leg was encased in several layers of crust and dirt, beneath which two ill-conditioned, retracted granulating defects existed. The tibia showed good apposition, with no longitudinal displacement, while the fibula showed both lateral and longitudinal displacement. There was marked false mobility, and the X-ray showed no traces of a callus.

By the condition of the leg, any bloody procedure of osteoplasty was rendered extremely hazardous, while it was easy to prepare sufficient space for the performance of a subcutaneous blood injection. Hence, on January 28, 1913, the following procedure was carried out: By previous acupuncture with a fine needle, the exact site of the fracture was established; this needle was left inserted between the two tibial fragments and served as a guide for the proper placement of the injection. Then, with an ordinary aspirating syringe, armed with a stout needle, about

an ounce and a half of blood was directly withdrawn from the patient's median vein. The guidance of the previously inserted needle rendered prompt and precise injection of the blood very easy, so that this was accomplished before coagulation. Considerable pressure had to be used to expel the blood. The puncture was protected with a small patch of iodoform gauze, the leg being put up in plaster.

No reaction followed, and a day or two later the patient was made to walk. On February 20 there was marked lessening of false mobility. As a double hernioplasty was done on that day at the patient's request, the anæsthesia was used for depositing another ounce of fresh blood at the site of the delayed union. By March 15 the leg ulcers had healed, and the deposit of a good callus became evident. The skiagram showed an interesting condition: First, the absence of any callus whatever about the fibula, which had not received any special treatment. Secondly, an abundant, spindle-shaped callus encasing the fragments of the tibia (like a plumber's splice), the line of pseudo-arthrosis between the fragments remaining clearly marked. This demonstrated that the fractured and apposed surfaces remained unaltered and ununited by bony deposit, and that the firm union of the fragments was due to an external callus.

Dr. Henry H. M. Lyle said he had used the Bier method ot treatment in three cases of double fracture of the lower extremity, two of them compound. He believed that this method should always be given a trial before either bone grafting, or bone plating were resorted to, and he had seen it succeed where the latter had failed.

Dr. Lyle said that he had experienced some difficulty in carrying out the technic as described by Bier, and he now used a slight modification which made the procedure very simple. The only drawback to Bier's original technic was that the blood clotted rather quickly which in some cases interfered with the thoroughness of the work. To overcome this drawback he drew up some warm sterile albolene through the needle into the syringe and then expelled it, leaving a fine film of albolene covering the needle and syringe. This film prevented the clotting in the syringe and needle, thus allowing a careful, accurate and thorough injection of blood around and between the fractured ends. He considered this small detail a great aid in carrying out this most valuable method of treatment.

PATENT URACHUS AND EPIGASTRIC HERNIA.

DR. GERSTER presented a man, fifty-two years old, a pedler, who four years ago contracted a swelling above the umbilicus. Since childhood he had noticed a slight leakage from the umbilicus whenever the bladder became distended. On admission, a large, easily reducible epigastric hernia was found just above the navel. A fine probe readily penetrated the apex of the inverted cone of the umbilicus, and cystoscopy showed that it had entered the fundus of the bladder through a conical elongation of the fundus upward, terminating in a shape like the entrance into a vesical diverticulum.

On March 6, 1913, two semi-elliptic incisions were made circumscribing both the epigastric hernia and the umbilicus, and penetrating all the components of the abdominal wall. The hernial contents, consisting, as usual, of parts of the round hepatic ligament, were replaced. Then the two incisions were united below the navel, and the cut line was extended downward two and a half inches further. It was noticed that under the parietal peritoneum a conical mass extended downward from the navel, widening gradually like a funnel into the full size of the bladder; in fact, that this funnel represented the fundus. Thus we might say that the bladder opened directly into the navel unless the umbilical end of the funnel were to be accepted as the urachus. The navel was severed from the top of the bladder directly below the skin, where the calibre of the funnel was about two millimetres. This was bent upon itself, depressed, and buried under three tiers of catgut sutures. Then the abdominal parietes were closed by the usual layer sutures. A small drain was placed against the apex of the bladder and withdrawn on the third day. For a few days the bladder was catheterized every six hours. Primary union followed. A skiagram of the bladder filled with collargol showed that the fundus had now resumed a normal domelike shape.

URINARY INFILTRATION AFTER RETROPERITONEAL URETEROTOMY.

DR. GERSTER presented a man, thirty-one years old, who entered the hospital with typical symptoms of a ureteral calculus, the diagnosis being confirmed by X-ray and ureteral catheterization. On November 16, 1912, by ureterolithotomy, a calculus

was extracted from the ureter midway between the kidney and bladder. The ureter was left patent, and by inadvertence, cigarette instead of tube drainage was employed. The wound was not disturbed until the fourth day, when, on withdrawing the drainage, large quantities of turbid urine were set free, escaping from the retroperitoneal space.

Copious suppuration followed, indicating retention. Hence, on December 12, the entire wound was reopened. A channel was found leading upward toward the kidney, another directly toward the spine and a third one downward into the pelvic retroperitoneal space. By December 31 the two upper tracts ceased discharging, but not so the pelvic sinus. Per rectum, a probe introduced into the sinus could be palpated through the posterior rectal wall. To drain this pocket, the coccyx was excised, and direct drainage was established by a retrosacral incision. This incision contracted rapidly and became inadequate; hence, on March 7, 1913, the sacrum was exposed and its lower half, on a line with the third pair of sacral foramina, was chiselled through and removed. This gave free exposure to a large cavity filled with exuberant granulations and pus, lying between the rectum and peritoneum anteriorly and the remnant of the sacrum posteriorly, which was curetted and packed. By this time the incision above Poupart's ligament had closed, and from now on the discharge from the presacral cavity became scanty and serous, also closing rapidly, so that the patient was discharged, cured, on April 6, 1913.

PULMONARY ABSCESS; COSTAL RESECTION AND IMPLANTATION OF SCAPULA.

DR. GERSTER presented a boy, nineteen years old, who nine months before admission had had pneumonia and pyothorax, for which drainage by intercostal incision was done at another hospital, from which he was discharged three months after operation with a small sinus. This had closed and reopened several times.

When the boy was admitted to the Mt. Sinai Hospital, on November 8, 1912, he was in a wretched general condition, with hectic fever and night-sweats, and exhibiting a retracted right chest with a narrow aperture in the seventh intercostal space, from which issued a copious discharge of pus. About a week

later, broad drainage was established by the resection of short segments of the seventh, eighth and ninth ribs. The cavity had two compartments, one running forward and upward, the other backward and upward toward the spine. Gradually, the discharge and fever diminished, but the boy's general condition did not improve. On December 14 the fever again rose, together with an increase in the flow of pus, and three days later short segments of the fourth, fifth and sixth ribs were resected in the space between the spine and the inner edge of the scapula, exposing the tract leading upward and inward. A thick coat of organized exudate covered the lung. Fluctuation being evident, this coat was incised, when a huge cavity, easily admitting the fist, was opened, from which there escaped about a pint of pus. This probably represented an interlobar deposit. Immediately, the patient's temperature fell, and improvement of the general condition became noticeable.

To close the large cavity, the procedure was divided into two steps: First, on February 1, to limber up the lower portion of the thorax, additional long segments (between seven and eight inches) of the eighth and ninth ribs were resected. Two weeks later the final and more extensive operation was done. The conditions then existing were as follows: Between the inner margin of the scapula and the spine, extending from the level of the fourth rib downward to that of the ninth rib, there was a defect of the thoracic wall giving entrance to a cavity located mainly under the scapula and extending laterally and forward to the axillary line, the ribs and scapula forming a sort of overhang. In the bottom of this cavity there lay exposed the collapsed lung, covered with a thick, fibrous deposit. Into the lung there penetrated a sinus which admitted the probe to the depth of an inch and a half. The main impediment to the approximation of the ribs to the collapsed lung was the integrity of the costal structures underlying the scapula. To eliminate the rigidity of this portion of the thorax an incision was carried down to the level of the ribs along the inner margin and the apex of the scapula, which was then easily detached from the thorax and turned over and outward like a trapdoor. Then, beginning from the eighth rib and going step by step upward to the third rib, each rib was resected in proportion to its entire length, so that about eight inches were removed from the seventh rib,

and two inches from the third rib, the anterior line of the section of the ribs corresponding to a vertical line placed a little forward of the axillary line. Naturally, the resection of the three uppermost ribs was done in the axillary cavity. By removing the third rib, the extreme apex of the cavity was broadly exposed. As soon as this was done, it was very easy to return the scapula to its natural position, and then to depress and engage its inner margin under the short costal stumps that had remained attached to their spinal articulations, so that the inner scapular margin was overlapped by these costal stumps. This manœuvre filled up the gaping cavity, and brought, as it were, the subscapularis muscle into close contact with the lung surface, the divided intercostal structures offering no resistance to close apposition. A large drainage tube was placed well up to the apex of the pleural cavity, and another one under the outer reflection of the scapulomuscular flap, and then, by a series of stout, through-and-through sutures, the outer structures were closely united down to the lower confines of the field of operation. The arm was then bandaged to the chest.

Moderate reaction and suppuration followed. The suture line healed by first intention, and by March 24 everything was absolutely dry and firmly healed. Convalescence was much aided by the salutary effect of the patient's stay in the out-door ward of the hospital. He had gained over twenty pounds in weight since the operation and was stronger and more ruddy than ever.

It would be interesting, Dr. Gerster said, to observe what efforts nature would make to liberate the imprisoned lung, to re-form a working pleural cavity and to readjust the thoracic deformity.

URETERAL CALCULUS AND PYELITIS SIMULATING APPENDICITIS.

Dr. Henry H. M. Lyle presented a woman, twenty-six years old, who was sent to the hospital a year ago by a consultant for immediate operation, the diagnosis being acute appendicitis, with which the history and signs apparently agreed. Two points, however, were suspicious: First, the point of tenderness was a little high; and, second, the temperature (105.4°) was rather unusual in acute appendicitis.

On vaginal examination, a stony hard, oval shaped body was

detected in the left fornix. Upon further questioning, it was elicited that the patient had had attacks of pain in the left side, and troubled with urination. The latter symptoms had apparently disappeared.

An X-ray, taken the following morning, revealed an oval shaped calculus in the left ureter, just above the bladder, associated with two phleboliths. Upon cystoscopy, the urine from the left ureter was sterile, while that from the right contained epithelial cells, pus and colon bacilli.

The patient refused operation and left the hospital. A year later she returned and requested that the stone be removed, as she was now having considerable pain in her left side. A second X-ray examination revealed the same condition as a year ago. Catheterization of the right ureter showed the urine to be sterile, while that from the left side showed evidences of colon infection.

The ureteral stone was removed through Gibson's extraperitoneal incision, and two phleboliths were removed from the base of the broad ligament.

At the time of this patient's first admission to the hospital, the picture was that of a right pyelitis, closely simulating appendicitis. The finding of the left ureteral stone was accidental, as at that time the stone was giving no symptoms. On her second admission, the picture had entirely changed: it was that of a stone in the left ureter, with superadded colon infection and a clear right kidney. Without the ureteral findings, the pain on the right side would doubtless have been regarded as reflex, and the case would have been classed as one in which the stone was on one side and pain on the other.

BONE TRANSPLANTATION FOR POTT'S DISEASE.

DR. LYLE presented a man, forty-eight years old, a patient at St. Luke's Hospital, who was suffering from pulmonary tuberculosis and tuberculosis of the sixth and seventh dorsal vertebræ. The history, physical signs and X-ray findings were those of acute Pott's disease.

Operation: A bow-shaped incision was made, extending from the fourth to the tenth dorsal vertebra. The fascia and muscles were separated in mid-line, over the tips of the spinous processes. The spinus processes of the fourth to the ninth dorsal

vertebræ were split, and the left half of each turned outward. A bone splint, eight and a half inches long, was removed from the tibia, and after being properly shaped, was placed between the spines of the vertebræ. The fascia and muscles were united over this splint by interrupted kangaroo tendon sutures.

The patient made an uninterrupted recovery, and at present shows an apparent functional and anatomical cure of the spinal lesion. The permanency of this, of course, was problematical, but the operation, in this case, had been of undoubted benefit.

ELBOW MOVABLE AFTER SUPPURATION.

DR. ROBERT T. MORRIS presented a man who had been subjected to some operation for "a tumor near the elbow-joint" two years previously. The nature of the operation could not be determined. The synovial cavity of the right elbow-joint had been suppurating since that time. The patient came to the Post-Graduate Hospital with a phlegmonous inflammation of the arm, and a synovial fistula discharging ropy, purulent synovial fluid. The joint cavity was opened widely and treated with a preparation consisting of 60 parts of camphor, 30 parts of phenol, and 10 parts of alcohol, at the suggestion of a member of the house staff, Dr. Hagmeir. Dr. Morris had anticipated making an excision of the elbow-joint and fixing the arm in the most serviceable position, but under the influence of this application the repair had become complete, leaving a movable elbow, with a range of movement at present extending over forty-five degrees.

PYLORECTOMY FOLLOWING FINNEY'S PYLOROPLASTY.

DR. HOWARD LILIENTHAL presented a man, fifty-five years old, who was operated upon by him by Finney's method in 1908 for a benign stenosis of the pylorus. A good-sized opening was made at the time, sufficiently large to admit three fingers.

The patient returned to Mt. Sinai Hospital in 1912, quite four years after the primary operation, with a recurrence of his symptoms, and much reduced in weight and strength. After a course of palliative treatment, which failed to give him relief, Dr. Lilienthal did a posterior gastro-enterostomy on January 6, 1913. At the same time he took occasion to examine carefully the region of the pylorus, which he found surrounded by a

mass of adhesions. The patient was in such a wretched condition at the time that nothing further could be done. Less than a month later, however, he had improved to such an extent that the abdomen was reopened and pylorectomy done. This proved extremely difficult on account of the adhesions. It was interesting to observe the extent to which the Finney pyloroplasty had shrunken, so that it would scarcely admit the end of a probe. The patient made a good recovery. He had regained his natural weight and now felt perfectly well.

In connection with this case, Dr. Lilienthal said he again wished to speak of the advisability of doing these operations in two stages. In this case, the patient could not have withstood the complete operation at one sitting.

Dr. Eugene H. Pool, who was present at the operation in the case shown by Dr. Lilienthal, said the pylorectomy was made unusually difficult by the dense adhesions. It was interesting to note the contraction of the stoma which had been made at the time of the original Finney operation. This, Dr. Pool thought, was rather unusual, and should not militate against the adoption of the method in future cases where it was indicated.

Dr. Gerster said that in doing a pyloroplasty, a large aperture did not insure against its closure. There was no aperture so large that it could not close, and on the other hand, an artificial closure of the pylorus could not be guaranteed to remain closed permanently. This fact was recently demonstrated in a case reported to the Society by Dr. Moschcowitz, where, after resection of the pylorus, followed by closure of both the stomach and duodenum by multiple sutures, communication was re-established between the stomach and duodenum.

In the case shown by Dr. Lilienthal, the speaker said, it was possible that a secondary peptic ulcer developed around the Finney aperture, with the formation of cicatricial tissue and contracture. In establishing a communication between the stomach and jejunum and excluding the duodenum, the surgeon, while he has accomplished something, has not cured the hyperacidity which gave rise to the original ulcers.

DUODENAL KINK.

Dr. Syms presented a woman, twenty-eight years old, who was admitted to the Lebanon Hospital on December 25, 1912.

After several weeks' observation on the medical side of the hospital she was transferred to the surgical service. At this time she was emaciated, weighing but 97 pounds, and highly neurotic; so much so that her case was thought to be one of hysteria. She was depressed, melancholic and emotional, and had been treated in several hospitals in this city without a satisfactory diagnosis having been made and without resulting benefit.

The patient's most obstinate symptom was vomiting, which came on soon after taking food and sometimes after drinking water. There was moderate constipation. While she was in the hospital she vomited two or three times a day and stated that this had been going on for nearly three years. During that time there had been periods of improvement, but there had never been a complete cessation of her trouble.

Examination showed that the woman was poorly nourished and emaciated, presenting the appearance of a patient with enteroptosis and neurasthenia. She had a scaphoid abdomen. There was slight tenderness in the right iliac region, but neither tenderness nor rigidity in the epigastrium. The vomitus contained partly digested food. No blood was found in the vomitus nor in the stools. The X-ray findings were negative and unsatisfactory, and failed to show any evidence of enteroptosis. Examination of the stomach contents showed very little deviation from the normal.

On January 23, 1913, through a right rectus incision, the appendix was found nearly normal, but slightly kinked. There was a pericolic membrane which, however, did not angulate or restrict the colon. This membrane was removed. There was a distinct angulation or kink at about the junction of the first and second portions of the duodenum, which was the result of peritoneal adhesions. These were cut between ligatures, and the angulation thereupon disappeared. There were no evidences of gastric or duodenal ulcer, and no apparent dilatation of the stomach.

The vomiting from which this patient had suffered for three years ceased with the operation, and it had not recurred. Since leaving the hospital, on February 14, 1913, her digestion has been entirely restored, her nervous symptoms have disappeared, and she has gained 24 pounds in weight.

SUPPURATING HYDATID CYSTS OF THE LIVER, SUBPHRENIC SPACE AND PLEURAL CAVITY.

DR. PARKER SYMS presented a woman, thirty-three years old, who was admitted to the Lebanon Hospital on November 14, 1910. Her previous history had no bearing on her present condition, which dated back about a month before her admission, when she began to suffer from a dull pain in the back and in the right side of the abdomen. This had gradually become more aggravated, and the patient had rapidly been losing flesh and strength. There was considerable elevation of temperature, with rapid pulse. There was no history of chills. The right lobe of the liver was palpable and tender.

Operation: Through a right rectus incision the liver was exposed. The gall-bladder was shrunken, but otherwise normal in appearance. There was a small nodule at the edge of the right lobe of the liver which was found to contain pus; it was evacuated and packed with gauze. There was also a large mass in the dome of the liver, which was aspirated, evacuating a greenish fluid. Upon incising it, there was removed a large quantity of bile-colored fluid containing pus and hundreds of collapsed daughter cysts.

After this operation, the patient improved temporarily. Then her temperature, which had dropped to normal, again became elevated, with rapid pulse. She lost strength and showed evidence of fluid in the pleural cavity. On April 6, a right intercostal thoracotomy was done, and a quantity of greenish fluid evacuated. About a month later the ninth rib was resected to secure more efficient drainage of the pleural cavity and subphrenic space.

The patient's improvement was slow, but after prolonged drainage she made a complete recovery. She was discharged on June 8, 1911, and has since remained in perfect health.

FRACTURE-DISLOCATION OF THE SHOULDER-JOINT: EXCISION OF THE HEAD OF THE HUMERUS.

DR. SYMS presented a man, twenty-seven years old, who was admitted to the Lebanon Hospital on January 8, 1912, with the history that one week before admission he had slipped and fallen, striking with much force on his right shoulder.

Examination showed a fracture of the upper end of the humerus, with dislocation of the head from the glenoid cavity. This diagnosis was confirmed by X-ray.

Operation, January 17, 1912: After freeing the head of the bone from its attachments and removing it, the shaft was replaced within the capsule of the joint. The capsule was closed as completely as possible, and the superficial wound closed, with drainage. The arm was retained in position with a modified Velpeau dressing. Motion was begun about the fourth week, and the patient was discharged on March 2, 1912.

This patient now had excellent function and was able to use his arm satisfactorily in all normal directions. There was slight limitation of the action of the deltoid, but the patient was able to lift his arm high above his head. There was evidence of some bone re-formation.

Dr. Syms presented also a boy, twenty years old, who was admitted to the Lebanon Hospital on January 1, 1913, with the history that on that day he was thrown from a moving train, striking on his head and right shoulder. Examination showed an avulsion of the scalp from the frontal region backward. There was no evidence of fracture of the skull, but the patient was irrational and violently maniacal for several days, requiring restraint. There was also a fracture of the shoulder-joint, and it was with great difficulty that his arm could be sufficiently immobilized to prevent the fragments of bone from penetrating the soft parts. After a number of days had elapsed, and a satisfactory examination became possible, it was found that he had a fracture of the upper end of the humerus, with dislocation of the head from the glenoid cavity. This diagnosis was confirmed by X-ray.

Attempts at reduction were futile, and the patient was not fit for operation until three weeks after his injury. On January 22, 1913, the joint was exposed anteriorly, going through the split fibres of the deltoid. The head of the bone was found dislocated, with its fractured surface pointing backward and outward. The head was removed with considerable difficulty, and the upper end of the shaft placed in the capsule of the joint. The capsule was then sutured and the superficial wound closed.

The patient made a good recovery and left the hospital on February 23, 1913. He now had very fair function of the arm.

He could move it in all directions, and while he could easily place his hand on top of his head, he could not raise it high above his head, there being a deficiency in the action of the deltoid.

DR. GERSTER asked if there was any reason why the head of the humerus was not saved in the two cases shown by Dr. Syms? There was no compound fracture, and according to the experience of Dr. Murphy, of Chicago, who had published a series of these cases, it might have been worth while to follow his example and liberate the upper fragment and nail it into the glenoid cavity. Even in a case where the head was disconnected, it apparently did not act as a foreign body, providing there was no infection. Dr. Gerster said that personally he had had no experience with this method.

DR. SYMS said that in the two cases he had shown, he had refrained from replacing the head of the humerus after excising it, for the following reasons:

When he operated on the first case he did not feel sufficiently familiar with the method, but was familiar with the good results obtained in these cases by removal of the head of the bone. This fact and his success with the first case prompted him to treat the second case in like manner.

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